

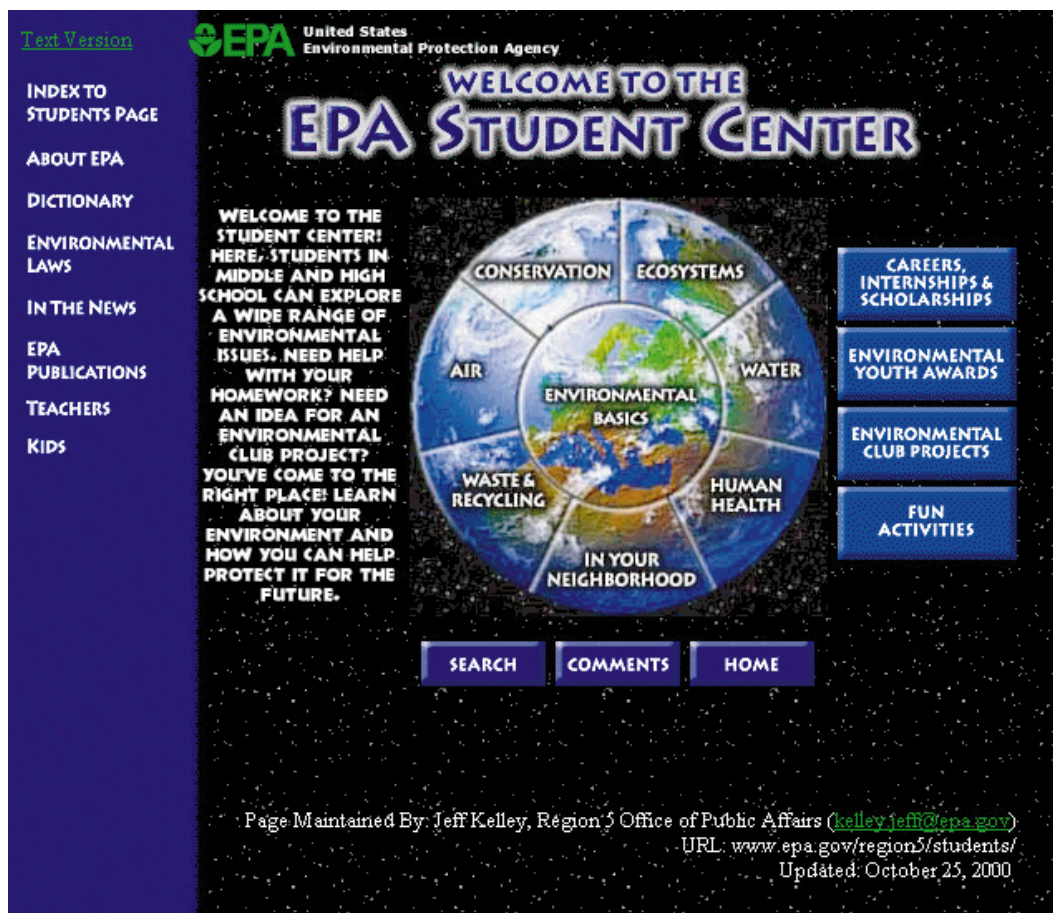


USABILITY ANALYSIS

of the

EPA Student Center Web Site

<http://www.epa.gov/students/>



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Usability Analysis of the EPA *Student Center* Web Site <http://www.epa.gov/students/>

EXECUTIVE SUMMARY

This report evaluates the usability of the EPA *Student Center* Web site (www.epa.gov/students/), an environmental education site for middle school and high school students, developed by the Environmental Protection Agency (EPA). The report presents the results of a combined effort by the EPA Office of Environmental Information (OEI), the EPA Access Workgroup, and Princeton Energy Resources International (PERI) to assess the *Student Center* site, identify concerns or “trouble spots,” and present recommendations to help guide further development of the site so that it provides the information that the user wants through a system that is easy to understand, easy to remember, and subjectively pleasing. The OEI served as the lead office for this effort.

The *Student Center* site provides links to EPA and other Federal Web sites that contain information on environmental issues, publications, careers and internships, project ideas, and other topics. It is one of a trio of EPA environmental education Web sites, which also include the *Explorers’ Club*, for children ages 5 to 12 and the *Environmental Education Center*, for teachers and other educators.

All three sites are portals: they provide the structure and framework to enable users to locate age-appropriate Web sites covering a wide range of environmental topics. The EPA Access Workgroup is responsible for maintaining the three sites and has developed criteria for evaluating EPA and other environmental Web pages to determine if they are appropriate for inclusion in one or more of the portal sites. The Workgroup is a component of the EPA Environmental Education Advisory Board and includes environmental education coordinators and Web designers from several EPA headquarters and regional offices.

The approach for evaluating the usability of the EPA *Student Center* involved the following three-step process:

- A *Primary Assessment*, or “expert review,” of the site, where an experienced Web site reviewer evaluated the *Student Center* in terms of broadly accepted usability criteria, including the site’s accessibility, form and functionality, and content;
- A *User Test* evaluation, in which “typical” middle school and high school student users were observed as they completed a series of task questions and took part in focus group discussions about the site. Two user test sessions were conducted. The first session comprised six 7th

and 8th grade students from Sandoval Elementary School in Chicago, Illinois, and the second session included five 10th and 11th grade students from Woodrow Wilson High School in Washington, DC; and

- An *Analysis*, where the results of the primary assessment and user tests were synthesized and assessed, and recommendations for enhancing the *Student Center* Web site were developed.

The EPA *Student Center* provides access to a rich variety of environmental information for students. Overall, the student test participants liked the site. They expressed enthusiasm for the design, particularly the center globe graphic, and commented that the site contains useful information. They also commented that they will return to the site if they need information for a school project. Some of their specific comments include:

“The topics on the globe were good and made sense.”

“The mouse-overs were good - the most efficient way to do it.”

“Kids don’t care about design - just need lots of information.”

“The site was easy to use.”

“It’s clearly organized, especially with the mouse-overs on the front page.”

“The design is good.”

“Sometimes took wrong turns, but could always find home.”

“I like the graphics.”

“I like that it is divided into sections.”

“I like that it has activities.”

“Wouldn’t change anything.”

“The information is useful, not so much interesting.”

Nevertheless, several problems were identified with the *Student Center*. For example, the site is not easily accessible from commercial search engines or the EPA home page. In addition, the students wanted to see even more information on the site, experienced some difficulties navigating the site, and reported that the purpose of the navigational buttons and aids were not always clear to them. These problems are evidenced by the students’ relatively low success rate in answering task questions: the high school test participants were able to successfully complete about 63 percent of the task questions, while the middle school

students were able to complete only about 48 percent of their tasks. They commented, for example:

“Design looks ‘1996’ but it works.”

“Graphics are functional - nothing real fancy.”

“The search engine didn’t work... nothing came up when I searched for ‘Maryland beaches’ and another time it gave irrelevant topics.”

“The broad topics are good; specific information is hard to find.”

“Would prefer all information in the center graphic.”

“I didn’t even think about the left side-bar.”

“I couldn’t find what I was looking for.”

“Put a direct *Student Center* link on the EPA home page.”

“Add more information... want to get as much information as possible, especially graphs, statistics for reports.”

“More games!”

“I’d like the site to have improved side-bar topics. Some information was under topics that didn’t particularly pertain to the topic it was under.”

“Bring refreshments!”

Expert review and user testing revealed a number of ways to improve the *Student Center* Web site. We reviewed the site according to nine distinct usability criteria and scored each of 50 key indicators of these criteria based on whether it is of “No/Limited Concern,” “Moderate Concern,” or “Major Concern.” Based on this analysis, we identified 17 areas of major concern, 18 areas of moderate concern, and 15 areas of no or limited concern. We then developed the following recommendations to address these concerns about the usability of the *Student Center* Web site:

Increase user accessibility to the site.

It is not easy finding the *Student Center* from either the EPA home page or commercial search engines. User accessibility to the site can be improved by registering the *Student Center* with more commercial search engines and educational resource/homework Web sites, publicizing the site to educators, schools, and environmental education organizations, increasing the visibility of the *Student Center* link from the EPA Home Page, the *Environmental Education Center*, and the *Explorers’ Club*, and ensuring that a link to the

Student Center is included in related headquarters and regional EPA sites, as well as other Federal environmental education Web sites.

Revise the structure of the home page and subsequent pages.

Almost half of the issues of “Major Concern” relate to problems of navigability and site structure. Numerous recommendations were made to improve the site structure, including: expand the left side-bar on the home page and subsequent pages; add a “*Student Center Home*” button to the top of every page; revise and add navigational links to the bottom of each page; enhance the visibility of the left side-bar by increasing the font size and selecting a clearer font; add pop-up mouse-over text for each topic in the left side-bar; create subheadings at the top of each second-tier page to avoid scrolling down the page to find relevant sites; and place visible links to the *Explorers’ Club* and *Environmental Education Center* Web sites below the left side bar.

Improve site navigability.

Add a site overview, improve the site index and search engine, and review the site regularly for bad links.

Improve site consistency and standards.

The site should be reviewed after all revisions are made to it and periodically thereafter to ensure that all features are consistent and that none is missing. Specific features to be reviewed include: banners, headings, and subheadings; mouse-over text; assignment of linked sites to all appropriate sections of the site; naming protocols; “Return to *Student Center*” frames; and “Exit EPA” markers.

Clarify terminology.

Define important environmental terms and concepts where they occur in the site (for example, in the introduction to a section or linked site), and consider linking terms to their definitions in the “Terms of the Environment” glossary. Add a description of the “Terms of the Environment” to its link in the “Environmental Basics” section of the *Student Center*.

Enhance user control/help.

Improve the visibility of the “Return to *Student Center*” frames, consider adding a “remove frame” option to the frames, and change the name of the “Comment” section to “Contact Us.”

Enhance site design.	Consider updating the design by using “trendier” colors or more graphics. Select larger and clearer font for the left side-bar labels, and make new images for the left side-bar and mouse-over labels so they will be visible when printed.
Assess accessibility to disabled users.	Add alternative text markers to all images, graphical buttons, image maps, and other non-text features. Review color combinations (especially the dark blue lettering on black) to ensure they are visible to color-blind and visually impaired users. Update or delete the text version of the site. Review the site based on EPA guidelines for accessibility and using an accessibility software program.
Evaluate technical problems.	Investigate problems incurred by students when downloading the left and right sidebars to see if these problems occur on other computers. Review “What is a Pesticide?” site and games to see if slow download time can be improved.
Add content.	Provide simplified versions of certain linked sites (e.g., “About EPA,” and “EPA’s Mission,”) and consider rating sites according to whether they are easy, moderate, or difficult to understand. Expand the “Environmental Basics,” “Environmental Club Projects,” “Ecosystems,” and “Careers, Internships & Scholarships” sections. Add more sites containing statistical information, maps, and graphs that students can use for research projects. Review EPA headquarters and regional office Web sites to identify possible sites to add to the <i>Student Center</i> .
Review for accuracy.	Periodically review the site for grammar and spelling errors and continue the on-going process of carefully evaluating sites before adding them to the <i>Student Center</i> .
Perform additional usability testing.	After the site has been revised, perform another round of usability testing to assess the effect of the changes. Work with EPA program offices and regional offices to assess the usability of existing linked sites and other EPA Web sites that can be included in the <i>Student Center</i> .

1.0 BACKGROUND

The Environmental Protection Agency (EPA) has developed a series of three environmental education Web sites:

- *Explorers' Club* for children ages 5 to 12;
- *Student Center* for students in middle school and high school; and
- *Environmental Education Center* for teachers and other educators.

All three sites are portals: they provide the structure and framework to enable users to locate age-appropriate Web sites covering a wide range of environmental topics. The EPA Access Workgroup is responsible for maintaining the three sites and has developed criteria for evaluating EPA and other environmental Web pages to determine if they are appropriate for inclusion in one or more of the portal sites. The Workgroup is a component of the EPA Environmental Education Advisory Board and includes environmental education coordinators and Web designers from several EPA headquarters and regional offices.

This report is one of a series of three reports that present the results of a combined effort by the EPA Office of Environmental Information (OEI), EPA Access Workgroup, and Princeton Energy Resources International (PERI) to assess the usability of the three Web sites, identify concerns or “trouble spots,” and help guide further development of the sites. The EPA OEI served as the lead office for this effort.

This report evaluates the usability of the EPA *Student Center* (www.epa.gov/students/). Aimed at middle school and high school students, the *Student Center* provides links to EPA and other Federal Web sites that contain information on environmental issues, publications, careers and internships, project ideas, and other topics.

2.0 APPROACH

The approach for evaluating the usability of the EPA *Student Center* Web Site involved a three-step process. We first performed a *Primary Assessment* in which we evaluated the usability of the site in terms of its accessibility, form and functionality, and content. Next, we performed a User Test evaluation, where we assessed the success of respondents in using the *Student Center*. Finally, we analyzed and synthesized the results of our primary assessment and user tests and developed recommendations for improving the *Student Center* Web Site. This approach is described in more detail below.

2.1 Primary Assessment

The Primary Assessment involved an “expert review” of EPA’s *Student Center* Web Site in terms of several usability principles. An experienced Web site reviewer evaluated the site according to its accessibility, seven major criteria related to its form and functionality, and to a more limited extent, the content of the portal site and its linked sites.¹ These usability criteria are described in Exhibit 1.

2.2 User Tests

The results of the primary assessment were used in conjunction with EPA input about goals and objectives for the site to create a tasking guide

Exhibit 1 – Primary Assessment Usability Criteria

Site Accessibility	The site should be quickly and easily accessible from commercial search engines and the EPA home page.
Form and Functionality	<p><u>Navigation and Visibility</u>: the site should always keep users informed about where they are and where they can go.</p> <p><u>Recognition Rather than Recall</u>: all objects, actions, and options on the site should be visible and broadly understandable.</p> <p><u>System/Real World Match</u>: the site should speak the user's language.</p> <p><u>Consistency and Standards</u>: users should not have to wonder whether different words, actions, or situations mean the same thing.</p> <p><u>Aesthetic and Minimalist Design</u>: the site should not contain information that is irrelevant or rarely needed.</p> <p><u>User Control and Help</u>: the site should help users recognize, diagnose, and recover from errors; help information should be succinct and easy to search.</p> <p><u>Accessibility to Disabled Users</u>: the site should be accessible to people with disabilities.</p>
Content	<p><u>Purpose/Target Audience</u>: the purpose of the site and the audience from whom the site is intended should be apparent.</p> <p><u>Coverage</u>: the breadth and depth of the site's content should be appropriate to the site's purpose and target audience.</p> <p><u>Accuracy</u>: the site should provide information that is accurate and free of errors.</p>

¹ Based on Jacob Nielsen’s ten usability heuristics and an extensive literature review of human factors research and web design. (See Keith Instone, “Usability Heuristics for the Web,” <http://webreview.com/WR/pub/97/10/10usability/sidebar.html>.)

consisting of an entry questionnaire, a set of task and focus group questions with observer notes, and an exit questionnaire. The guide was administered to six 7th and 8th grade students at Sandoval Elementary School in Chicago, Illinois, and five 10th and 11th grade students at Woodrow Wilson High School in Washington, D.C. Because of the different levels of knowledge and ability between middle school and high school students, a separate tasking guide was developed for each group of participants.

Exhibit 2 summarizes participant characteristics, including their previous experience with the Internet and the EPA *Student Center*. As shown in the exhibit, the eleven student test participants represent a range of Internet experience. The high school students have more experience with the Web, but the middle school students have had more experience using the *Student Center*.

At each school, students were asked to complete an Entry Questionnaire, which requested information about the students' grade, Internet experience, and familiarity with the *Student Center* Web Site. An EPA moderator then led the group of students through an elicitation process designed to evaluate the user's success in navigating the *Student Center* Web Site, and ensure that all users saw

and experienced a certain number of similar aspects of the site. The moderator first asked some focus group questions about the participants' preferred methods of searching for environmental or other information. The moderator also asked the middle school participants' for their overall initial impressions of the site. Next, the moderator asked the participants to complete tasks to find specific informa-

Exhibit 2 – EPA *Student Center*: Participant Characteristics

Characteristics		Middle School Students	High School Students	All Students
Grade	7th	3	0	3
	8th	3	0	3
	10th	0	1	1
	11th	0	4	4
WWW Experience	Beginner	4	0	4
	Intermediate	2	2	4
	Advanced	0	3	3
Frequency of WWW Use	Greater Than or Equal to Once/Day	0	5	5
	Less Than Once/Day	1	0	1
	Once/Week	1	0	1
	Less Than Once/Week	4	0	4
Typical Connection Speed	Slow	4	1	5
	Fast	2	4	6
Previous Use of <i>Student Center</i> Site	Yes	5	1	6
	No	1	4	5

tion on the Web site. The session closed with a final focus group question for the high school students, seeking their overall impressions of the site, and a written post-test questionnaire.

During the focus group and task questions, an EPA or PERI observer sat with each student, recording the answers given by the participant, the path used by the participant to locate the task answer, comments and frustrations, technical difficulties, and/or problems the participant experienced. Throughout the elicitation process, the moderator and observers encouraged the users to “talk out loud,” expressing their opinions and perceptions as they surfed the site.

The entry and exit questionnaire responses, observers’ notes, and participants’ comments were summarized and evaluated based on the usability principles defined for the Primary Assessment. In addition, we assessed the *Student Center* site in terms of the participants’ success in completing their assigned search tasks, and the occurrence of any “catastrophic errors” during the elicitation process. These evaluation criteria are described in more detail in Exhibit 3. A copy of the tasking guide and a summary of the participants’ responses are provided in Appendices 1 and 2, respectively.

2.3 Analysis

Based on the results of the “expert review” and user testing, we prepared a narrative evaluation describing how well EPA’s *Student Center* Web site meets each usability criterion and, for each criterion, scored relevant features of the site on a three-point scale (No/Limited Concern, Moderate Concern, Major Concern). This analysis is presented below in Section 3.0, “Portal Site Results.” A summary evaluation of the Web sites that are linked from the *Student Center* is provided in Section 4.0 (“Analysis of Linked Sites”). Procedures for improving the usability of the *Student Center* were developed from these analyses (see Section 5.0, “Recommendations”).

Exhibit 3 – User Test Evaluation Criteria

Usability Principles	Entry/exit questionnaires, observers’ notes, and participants’ comments as related to accessibility, form/functionality, and content criteria.
Task Completion	Were the users able to successfully complete the requested tasks? How much searching was required to complete each task? Was tangential or excessive searching/clicking needed to complete tasks? Did the users become disoriented or lost?
Catastrophic Errors	Did the users lose their Internet connection, get bumped off the site, lose interest due to length of time required to complete tasks or other reasons?

3.0 PORTAL SITE RESULTS

This section describes our findings regarding the site accessibility, form and functionality, and content of the EPA *Student Center* Web site, based on analysis and synthesis of our primary assessment and user testing. A review scorecard that distills our findings and offers an easy benchmark for future assessments is also provided. This assessment focuses on the portal portion of the *Student Center*.

3.1 Overview

The EPA *Student Center* provides access to a wide variety of environmental information. In general, the high school and middle school test participants liked the site. They expressed enthusiasm for the design, particularly the center globe graphic, and commented that the site contains useful information. Nevertheless, the preliminary review and user tests of the *Student Center* revealed a number of concerns relating to the accessibility, form and functionality, and content of the site. This section presents a brief overview of the user test findings based on the test participants' general assessment of the *Student Center* and ability to complete the task questions. A more detailed analysis, based on usability principles, is presented in the subsequent sections.

Task Completion

Exhibit 4 summarizes information on task completion for the student participants. Overall, the high school students encountered fewer problems answering the task questions than the middle school students. In their post-test questionnaires, all of the high school students reported that they knew where they were when navigating the site, it would be easy to find interesting information on the site, and information flowed logically most of the time. The high school students were able to successfully complete an average of five of the eight, or about 63%, of the task questions. The number of correct responses per participant ranged from four to six.

All of the five high school participants were able to answer Task 1 (find the *Student Center* from the EPA home page), Task 2 (look for information describing EPA's main purpose), and Task 7 (how much garbage was generated in the U.S. during 2000?). They had more trouble with the other five tasks. Only three of the six participants could find information on the function of the ozone layer (Task 3), environmental scientist careers (Task 4), beaches in Maryland (Task 5), and a science experiment about cleaning up oil spills (Task 6). Only one student was able to find a map showing the concentration of sulfur dioxide in the air in 1996 (Task 8).

There were many explanations for why a participant had difficulty answering a task question. In some cases, a student tried to use the search tool, but was frustrated by the overly general search results. Other times, the student could not identify the right starting point (for example, the two students who could not find information on careers in environmental science were unable to locate the “Careers, Internships, and Scholarships” button). In other cases, students found their way to the correct first button and/or site but could not find the requested information (e.g., in Task 5, one student found the correct site but could not find information on pollution at a Maryland beach; in Task 8 students had difficulty finding their way to the “Environmental Atlas” site to find the 1996 SO₂ concentration.) These problems can be reduced by improving the *Student Center*’s navigation functions, as described later in this report.

The middle school students were less successful than the high school students. While the middle school students generally expressed enthusiasm for the *Student Center*, all but one of the six participants reported feeling lost when performing a task and three thought it would be difficult or moderately difficult to find interesting information on the site. The middle school participants successfully completed an average of 2.4 of five tasks, for a completion rate of 48%. The number of correct responses per middle school participant ranged from 1.5 (one student answered the first part of a two-part question) to four.

Exhibit 4 – Task Completion			
Task Completion Indicator		Middle School Participants	High School Participants
Task Completion Rate		48%	63%
Number of Correct Responses per Participant		1.5 - 4	4 - 6
When Performing a Task, Participant Was:	Lost	5	0
	Knew Where He/She Was	0	5
	No Response	1	0
Finding Interesting Information Was:	Easy	2	5
	Moderately Difficult	1	0
	Difficult	2	0
	No Response	1	0
Information Flowed Logically:	All of the Time	2	0
	Most of the Time	1	5
	Some of the Time	1	0
	No Response	2	0

Every middle school student was able to successfully complete the final question, which was to find and play an environmental game. The first four questions were much more difficult for the students: only two of the six students could find information on the function of the ozone layer (Task 1), the EPA's main purpose and functions (Task 2), and information on environmental careers (Task 3). Three of the six participants were able to find a site describing common pesticides found at home (Task 4).

It is interesting to note that if a middle-school student found the correct starting place from the center globe or side-bar, then s/he usually found the answer to the task. This indicates that it is crucial that the labels for all buttons and links be clearly marked, and the mouse-over descriptions provide a complete listing of all topics found in each section. It also suggests that users do not always read the button titles and mouse-over descriptions, even when they are there. For example, in Task 1 the participants were asked to find a site that would help them write a report about the ozone layer. The mouse-over text for the "Air" section of the center globe graphic clearly lists "ozone" as the first topic in that section, yet only three of the six participants went to the Air section. This suggests the need for alternative search functions, such as a good search engine and a subject index, for students who do not want (or are not able) to thoroughly read all labels.

Technical and "Catastrophic" Errors

No catastrophic errors occurred during user testing resulting in loss of Internet connections. However, most of the high school students experienced a problem where the left and right side-bars did not load properly. Whenever the students entered or re-entered the site, the side-bars would not appear. The students were able to load the side-bars by either clicking on the location where the side-bars should be or by hitting the "refresh" button. This problem took time away from task completion and caused some confusion among the students. While this problem did not occur during any of the other *Student Center* usability test sessions, it could indicate a problem using the *Student Center* Web site on older computers. This could be tested by trying the site on several different computers. Other technical problems included broken links (discussed in more detail in later sections) and slow download times for the "What is a Pesticide?" site and various games.

3.2 Site Accessibility

Students should be able to find the EPA *Student Center* when searching the Internet for environmental information for school projects or just for fun. We evaluated the accessibility of the site from commercial search engines and from the EPA home page.

Commercial Search Engines

It is very important for a Web site to be quickly and easily accessible from commercial search engines. Of the 11 middle school and high school students who participated in our user testing, six reported that they would use search engines to find environmental information on the Internet, one reported that he would begin his search from the EPA home page, and one middle school student reported typing possible URLs into the address box. The remaining students did not report their preferred method of finding information. The students reported that they use search terms that are related to the topic they are looking for (e.g., air, water pollution).

PERI staff reviewed accessibility to the *Student Center* from five commercial search engines: Google, Yahoo, MSN, Lycos, and Monster Crawler.² For each search engine, ten searches were performed using different key words and phrases commonly associated with EPA or environmental issues. Exhibit 5

displays, for each key word or phrase, the number of search engines that returned a listing for the EPA *Student Center* or for the EPA home page in the first twenty responses to a query.³ The only search terms or phrases that resulted in locating the *Student Center* were “environmental information for students” (found by three of the five search engines) and “environment, student” (found by one search engine). None of the search engines we tested led us to the EPA

**Exhibit 5 – Commercial Search Engines Listing
EPA Student Center and EPA
Home Page by Search Criteria**

Search Criteria	# Commercial Search Engines	
	Student Center	EPA Home Page
Environmental Information for Students	3	1
Environment, Student	1	0
EPA	0	5
Environment	0	3
Environmental Information	0	1
Air Pollution	0	0
Ozone	0	0
Water Pollution	0	0
Recycling	0	0
Garbage	0	0

* Based on evaluation of five search engines.

² These search engines were selected based on a combination of their overall frequency of use (see December 2000 Nielsen/Net Ratings (www.searchenginewatch.com/reports/netratings.html) and the search engines that are used by the test participants of all three environmental education Web sites.

³ A search was considered successful if it resulted in a listing within the first 20 sites of the search results and brought the user to any page within the *Student Center* site. It was not considered successful if the link brought the user to the EPA *Explorers' Club* or *Environmental Education Center*.

Student Center when we searched on the more commonly used search terms (e.g., EPA, environment, air pollution, recycling). While all five search engines found the EPA home pages when the search term “EPA” was used, only three located the home page when searching on the term “environment” and only one search engine located the home page when we used the terms “environmental information for students” or “environmental information.” It should be noted that many of the search engine/search term combinations led to other EPA Web sites, such as the Office of Water home page or the Ozone Depletion site.

These results indicate that it is very difficult for users to locate the EPA *Student Center* by using commercial search engines. Our user tests suggest that it is not common for students to include the term “student” or even “EPA” or “environment” in their Internet searches, but these were the only search terms that led us to either the *Student Center* or the EPA home page. Several changes can be made to enhance accessibility to the EPA *Student Center*. Additional key words and phrases describing environmental topics (such as air, water, recycling) can be added to the meta tags for the site. These words should be placed before the more general terms (e.g., environmental information for students). The *Student Center* should be listed with as many commercial search engines as possible and could also be listed on homework Web site or other educational resource sites for students. Also, EPA might increase awareness of the *Student Center* and EPA home page by marketing them (through mailings, announcements, etc.) to teachers, teacher associations, students, and environmental education organizations. Another way to increase accessibility is to work with the Web masters of other regional and headquarters EPA sites, as well as other federal, state, local, and non-governmental environmental sites to include links to the *Student Center* on these sites.

EPA Home Page

The accessibility of the *Student Center* Web site from the EPA home page was assessed based on the results of a user task which asked the students to find the EPA *Student Center* from the EPA home page. All five of the high school students and four of the six middle school students were able to locate the *Student Center* from the EPA home page. Three of these students found the *Student Center* by clicking on “Audience Groups” in the left side-bar of the EPA home page, three found it by clicking on “Kids” on the EPA home page and then finding the *Student Center* link from the EPA *Explorers’ Club* Web site, and one used the EPA search engine to find the *Student Center* (no information was recorded on how the remaining two students found the *Student Center*).

Despite these successes, several of the students who were able to complete the task still had difficulty locating the *Student Center*. Some did not initially think to click on the “Audience Group” or did not notice the mouse-over text that lists “students”

as an audience group. Others found their way to the *Explorers' Club* Web site by clicking on the “Kids” link, but could not find the *Student Center* from this site. These students all had the benefit of knowing that there is a special EPA site for students. If a user is not aware of the *Student Center*, it might be more difficult to find the site from the EPA home page, since the user might be more likely to look for information by topic rather than by target audience.

Several changes could be made to the EPA home page to enhance the accessibility of the *Student Center* from this page. The students suggested adding a direct link to the *Student Center* from the EPA home page, similar to the “Kids” icon that links to the *Explorers' Club* Web site. Other ways to improve accessibility to the *Student Center* would be work with the Web master of the EPA home page to increase the visibility of the “Audience Groups” label in the left side-bar (e.g., by using a larger font) and add a more visible mouse-over descriptor or drop-down menu to the “Audience Groups” label. It might also be possible to add a link to the *Student Center* from the “Browse Topics” page, to assist those users who search by topic. A related approach to increasing accessibility to the *Student Center* would be to improve the visibility of the existing link to the *Student Center* that is in the *Explorers' Club* (see companion report assessing the usability of the EPA *Explorers' Club*).⁴

3.3 Form/Functionality

This section assesses the *Student Center* based on the eight usability criteria for judging the form and functionality of a Web site, and on the results of both the preliminary assessment and user testing.

Navigation and Visibility

A Web site should be constructed so that the user is always informed about where s/he is and where s/he can go within the site. It is important to provide

⁴After the usability testing was performed, EPA removed the “audience” button from its home page and added an “educational resources” button, which includes links to the kids, students and teachers Web sites. Additional testing would be required to determine if users can find the *Student Center* more easily as a result of this revision.



the user with: 1) a clear overview of the site's content and structure; and 2) easy methods to find whatever information s/he is looking for.

The EPA *Student Center* Web site is structured in a way that is relatively easy for students to follow and contains several features designed to assist the user in navigating through the site. Nevertheless, all but one of the six middle school students reported feeling lost when performing a task and three thought it would be difficult or moderately difficult to find interesting information on the site. While the high school students were more confident and successful in completing their tasks, their searches sometimes involved false starts and/or resulted in frustration or confusion. Results of the user tests, combined with the expert review, suggest several improvements that would enhance the site's navigability and visibility.

Provide a site overview. As described above, it is important to provide an overview of a site's content and structure. An overview is helpful to those users who prefer to obtain an initial understanding of a site before searching for information, and also serves as a reference if a user is lost or confused. A site overview can be particularly helpful in the *Student Center* Web site since it is a portal to EPA and other government Web sites, and so may be confusing to users who do not realize when they have left the *Student Center*.

While the home page does contain an informative introductory paragraph when the user first enters the site, it cannot easily be retrieved or re-read once the user moves the mouse to another position on the home page. A "Site Overview" or "Getting Started" section (added as a link in the left side-bar of the site) should include the information in the existing introductory paragraph. In addition, it should briefly describe the purpose of the *Student Center*, who operates the site, the target audience, the general type of information found on the site, and the fact that it is a portal through which users will be linked to other EPA and non-EPA government Web sites. It might also be helpful to explain that companion sites exist for younger students and for teachers.

Provide a site map or index. A site map or index helps the user understand a site's content and structure and is particularly helpful to users who do not like to "click through" the pages of a Web site to find information. A site map illustrates the layout of a site, while a site index provides an alphabetical listing of all the topics contained in the site. The *Student Center*'s "Index to Students Page" is actually a site map rather than an index because it lists the main site topics in the general order that they appear in the site.

The *Student Center* site architecture is not very complex and is well-illustrated via the center globe and right and left side-bars on the home page. Consequently, an alphabetical index will probably be more helpful than a site map to

most users. User testing did not provide feedback about the *Student Center* index since none of the student test participants used the index. Nevertheless, based on the preliminary assessment, several revisions could be made to improve its functionality. The main topics (and any sub-topics) should be placed in alphabetical order so that the user can easily find the particular issue that s/he is interested in. The main subject topics/sub-topics from the center globe graphic (e.g., air, conservation, environmental basics) could be listed separately from the left and right side-bar topics. In addition, the heading “EPA *Student Center*” should be moved to the top of the page, since it is the main banner for the site. The phrase “U.S. EPA *Student Center*” should be removed from each line where it currently appears in order to alleviate clutter from the page and increase the visibility of each topic.

Provide a search engine. The search engine is another useful means for locating desired information. Although all of the high school students and one middle school student used the *Student Center* search engine during the user testing, none of these participants was satisfied with the results of his or her search. As one student stated, “the search engine didn’t work... nothing came up when I searched for ‘Maryland Beaches,’ and another time it gave me irrelevant topics.”

The *Student Center* search engine frequently provides links to general sources of information about the search term rather than to specific Web sites. For example, when a search for the term “recycle” was performed, most of the hits were links to pages within the *Student Center* that contain Web sites on recycling (e.g., the “In Your Neighborhood” and “Conservation” sections of the site), rather than to the sites themselves. While the search did provide a direct link to the Web site “Recycle City,” it did not provide links to the “Municipal Solid Waste Factbook” or the “Consumer’s Handbook for Reducing Solid Waste,” which contain the word “recycle” in the body of the site but not in the title. Other searches resulted in links back to the *Student Center* home page or to the site index. Another problem with the *Student Center* search engine is that the search results are cluttered and difficult to read: the phrase “US EPA *Student Center*” is often repeated on each line after the name of the site link, and each hit is listed on two lines (the title of the hit is on one line and the URL is on a second line).

In summary, the *Student Center* search engine would be much more user-friendly if it is revised so that:

- a. It provides links to specific Web sites rather than to the more general pages within the *Student Center*,
- b. It searches each entire site, rather than just the site’s title,
- c. Each hit is listed on one, rather than two, lines (the URL can be placed

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- in parentheses in a small font size directly after the Web site title), and
- d. The phrase “US EPA *Student Center*” and any other irrelevant information is deleted from each line of the search results.

The visibility of the search engine could be improved by adding a search box on the home page so users can type search terms without having to click on the search link.

The *Student Center* search engine is constructed so the user can choose to focus their search on either all sites linked to the Center or all EPA Web sites. Test participants suggested that the user have the additional choices of searching just the relevant page of the *Student Center* (e.g., the “Waste & Recycling” section) and/or all government Web sites. Searching individual sections of the *Student Center* might be useful if the number of Web sites contained in the *Student Center* increases substantially, but would probably not save the user any time or effort at this point. While it would be possible to allow the user to search all government sites, this could result in confusion since it would often take the user outside of the *Student Center*. In addition, numerous commercial and government search engines are available if the user wishes to conduct a wider search for environmental information.

Provide Links to Home and Other Pages. Another way to enhance navigability and visibility is to provide clearly marked links to the site’s home page and other main pages, so that the user can always find his or her way back to these pages easily and without scrolling. The EPA *Student Center* provides user access to the home page and other main sections in the site by including home buttons on each page of the site and repeating the eight main topics on the left side-bar of each page. Nevertheless, the following revisions and additions could be made to these links to improve site navigability:

- Create “*Student Center* Home,” “Office of Environmental Education Home,” and “EPA Home” buttons to replace the generic “Home” button that appears at the bottom of each page. Currently, the “Home” button on the bottom of the home page takes the user to the EPA home page, while an identical “Home” button at the bottom of subsequent pages links back to the *Student Center* home page. This can be confusing to the user, who must figure out what “home” means each time it appears.
- Revise the bottom links. These should include the following: “Index,” “Search,” “Contact Us,” and the three home links described above. These are all features that should be easily available to the user without needing to scroll up the page. These links may need to be put on smaller buttons or placed in brackets [], or separated by lines |. Since

the current “Comments” section gives the user the opportunity to both make suggestions and ask questions, the phrase “Contact Us” seems a bit more descriptive.

- Add a “*Student Center Home*” button to the top of each page just above the left side-bar. This will enable the user to return to the home page from any page in the *Student Center* without scrolling to the bottom of the page.
- Make the EPA logo a link to the EPA home page and the *Student Center* banner (at the top of each page) a link to the *Student Center* home page. This provides the user with an alternative way to return to the EPA and *Student Center* home pages without creating any extra clutter on the page.
- Expand the left side-bar on the pages subsequent to the home page to include all of the existing left side-bar headings plus the main eight main topic headings that are on the center globe. This will enable the user to get to almost any page from anywhere in the site and to know exactly where s/he is at all times. It is probably not necessary to include the right side-bar topics.

Include a banner heading, main heading, and sub-headings on every page.

Each page of a Web site should identify the site name (e.g., “EPA *Student Center*”) and any appropriate headings or sub-headings (e.g., “Air”). This enhances both site navigation and site consistency by ensuring that the user will always be informed of exactly where s/he is within the site.

Most of the pages within the *Student Center* do not contain the name of the site (one exception is the “Index to Students Page,” where the “*Student Center*” title is below the main heading). This means that the user must remember that s/he is in the *Student Center*. In addition, s/he will not know where s/he is if s/he enters the middle of the *Student Center* from another web site. Therefore, “EPA *Student Center*” should be added to the top of each page, just below the EPA logo and above the main heading for the page. This may require the main headings to be reduced in size.

Avoid the Need to Scroll. Many users do not like to scroll up and down the page to find information. The EPA *Student Center* requires the user to continually scroll from the top to the bottom of the page and back again in order to find his/her way to the home page or to other pages within the site. One way to avoid the need to scroll is to place all critical content and navigational options on the top part of the page. As described previously, placing a *Student Center* home button on the top of each page will alleviate the need to scroll down in order to return to the home page. Similarly, adding *Student Center*, OEE, and

EPA home buttons to the bottom of each page alleviates the need to scroll back up in order to get home.

Another scrolling issue was illustrated during the user testing. Some of the middle school participants were unable to complete their tasks because they did not scroll down far enough to find the answer. Several of the *Student Center* pages (e.g., Air, In Your Neighborhood, Human Health) require the user to scroll down the page in order to see all the sites listed in the section. The easiest way to alleviate scrolling is to add sub-headings to the top of each of those sections that require scrolling. The sub-heading topics could be the same as the mouse-over sub-topics that describe each “globe” topic on the home page, and would link to the appropriate subsection further down the page, listing all sites related to the specific sub-topic. As the site expands in size, the sub-topics should each be placed on a tertiary-level page. It may also become necessary to add an alphabetical listing of all subjects, similar to the “Browse EPA Topics” section in the EPA home page, or possibly even to create a searchable data base.

Review for Broken, Incorrect, and Orphaned Links. Web sites should be periodically reviewed for broken, incorrect, slow, and orphaned links. The preliminary assessment and user test revealed a few broken, incorrect, and slow links, including: In The News/EPA Press Releases; Environmental Youth Awards/President’s Environmental Youth Awards/Applying for President’s Environmental Youth Awards (slow download); Human Health/Learn About Chemicals Around Your House; and Conservation/Creature Feature.

Recognition Rather than Recall

All of the objects, actions, and options on a Web site should be highly visible and broadly understandable so that users can refer to them as guides without needing to remember what they mean. There are a number of ways to construct Web sites to ensure that the user can easily locate and understand the meaning of every site feature. These are described below.

Ensure that all buttons, labels and other options are easily visible. An important feature of the *Student Center* site is the informative introductory statement that appears as a mouse-over when the user first enters the site. Unfortunately, as described previously, the introduction is not highly visible because it appears only when the home page is first opened and cannot be retrieved or re-read once the user moves the mouse to another position on the home page. The introduction should be relocated to a permanent position underneath the “EPA *Student Center*” banner (the globe can be moved down to allow room). As mentioned previously, the introduction should also be included in the new “About the Site” section.

Another site feature that is not easily visible is the left side-bar. Several of the middle school participants either didn't notice or forgot to check the left side-bar when looking for task information. As one student put it, "I didn't even think about the left side-bar." One reason for this is that the center globe graphic is the dominant and attractive feature in the home page and so attracts more attention than the side-bars. Compounding this problem is the issue that the left side-bar topics are in a relatively small font size and a little out of focus. Thus, the left side-bar could be made more visible to site users by increasing the font size, and using a clearer, more interesting font. Student participants suggested adding a small graphic next to each topic to increase visibility, but care should be taken to avoid any unnecessary clutter.

Select text colors, background colors, and font types/sizes that are legible and functional. The student participants had no trouble reading the text on the globe or the topic headings on the second-level pages. Nevertheless, some of the dark blue/black color combinations may be a little difficult for "older" eyes, and possibly, color-blind users to read. Similarly, the site information on the bottom of the home page appears a little out-of-focus.

Ensure that the purpose of each button and label is clear. For the most part, the students found the center globe to be clear and understandable. One student remarked, "the topics on the globe were good and made sense." However, based on results of the preliminary assessment and user tests, several other buttons, links, and labels used in the *Student Center* are not completely understandable to the user. For example, the "Teachers" and "Kids" links on the left side-bar look like links to pages within the *Student Center* when, in fact, they take the user off the *Student Center* Web site to the other environmental education sites. This is a problem for two reasons. First, a Web site should be designed to keep its users on the site for as long as possible before sending them to other, related sites. Second, if a user does want to find a site for kids or teachers, these two links are not very visible and their purpose is not clear. The links will be more understandable if they are placed on small buttons, star bursts, or other graphics, and moved several lines below the other left side-bar labels. In addition, the "Students and Teachers" button that appears on the top right corner of each of the second-level pages in the *Student Centers* should be removed. Not only is this button title redundant with the "Teachers" and "Kids" links, but it does not link to any site.

The middle school participants had trouble answering the one task question that involved starting at the left side-bar. One reason for this (as described above) appears to be that some of the students did not notice the left side-bar at first. Another reason is that the button titles were not intuitively meaningful to the students. When asked to find information about EPA's purpose, only one middle school student immediately went to the "About EPA" button, while the others

tried “EPA Publications,” “Environmental Basics,” “Student Internship,” and “Environmental Club Projects.” Two of the six participants eventually found the answer to this question. One way to improve the clarity of these links would be to add mouse-over text, similar to the mouse-overs used for the center globe and right side-bar, listing the contents of each link.

Another instance where a feature’s purpose is not clear occurs in the bulleted lists of Web sites on the second-tier pages. The link is on the name of the Web site, but several middle school participants tried to click on bullet. Putting the link on both the bullet and site name will alleviate this problem.

Use pop-up descriptions and mouse-overs. The *Student Center* makes good use of mouse-overs in the center globe and right side-bar, and many of the student participants used this feature. One student state, “the mouse-overs were good – the most efficient way to do it.” However, as described above, mouse-over text should also be used with the left side-bar. It is important to review all mouse-over text to ensure that it describes, clearly and accurately, the contents of each topic, and to conduct a review each time a new site is added to the *Student Center*. In some cases, the mouse-over topic does not clearly match its subject topic. For example, the one Web site related to pesticides (“What is a Pesticide?”) is in the Human Health section. While this designation makes sense for the specific Web site, it is possible that any new pesticides sites would be assigned to a different section.

Use words, rather than graphics, as labels. The *Student Center* Web site relies on words, rather than graphics, as labels. While graphics should typically be avoided unless they serve a purpose, some of the younger student participants expressed an interest in seeing graphics on the left and right side-bars.

Provide multiple access points to information, but not so many as to clutter the site. As described in the previous section, adding top and bottom home buttons, creating links on the EPA logo and *Student Center* banner, and including the center globe topics in the left side-bar will give the user many ways to access the information in the site without adding clutter.

System/Real World Match

Another principle fundamental to a well-designed web site is that the information presented in the site should be written clearly in language that is familiar to the site’s users. Technical terms and jargon should be avoided, and all terms and metadata in tables should be clearly defined.

The *Student Center* site is well-written and, for the most part, the page and site descriptions are concise, clear, and appropriate for both middle school and high

school students. There are a few instances where environmental terms are introduced without a clear definition. For example, “ecosystem” is not well-defined in the “Ecosystem” section of the site. Similarly, while terms such as “global warming” and “acid rain” are used in the descriptions of links to web sites on these topics, it would be helpful, especially for the younger users, to define these terms when they are used.

Technical terms, jargon, and acronyms are generally not used in the portal site, and there are no statistical tables that require definition of technical terms. None of the test participants expressed concern or frustration with the language, and at least one high school participant noted that the writing and descriptions in the site were clear and easily understandable. Test participants did report some problems in understanding the language of some of the sites linked from the *Student Center*. These issues are summarized in Section 4.0, “Analysis of Linked Sites.”

An important way to ensure that users understand the language used in a Web site is to include a dictionary or glossary of terms. The inclusion of the EPA “Terms of the Environment” site and the fact that the user can access the site from both the left side-bar and the “Environmental Basics” section, is an important asset for the *Student Center*. A few minor revisions could further improve the likelihood that site users will notice and use the dictionary. The dictionary would be easier to spot if the topics on the left side-bar are written in a larger and less blurry font. Second, the description of the “Terms of the Environment” Web site is missing from the “Environmental Basics” section and should be added. Finally, it might be helpful to review the *Student Center* site for environmental terms that might be difficult to understand (e.g., “ecosystems”) and link them directly to their definitions in the “Terms of the Environment” Web site.

Consistency and Standards

The language, actions, and situations in a Web site should be consistent so that their meanings are clear to the user. One important element of Web site consistency is to adopt consistent design features and interface elements from page to page. Several design and format revisions have been suggested in other sections of this report (see, in particular, “Navigability and Visibility”, and “Recognition and Recall”). Once these changes are made, the entire site should be reviewed to ensure that all features, headings, and titles are consistent across the site. Care should be taken to ensure that all headings, titles, topics, etc. are listed in the same order on each page in the site. For example, the eight main topics are currently listed in different orders on the center globe and the left side-bars on second tier pages.

Another inconsistency in the *Student Center* involves the terms listed in the home page mouse-over for the “Environmental Basics” section of the center globe. The terms “air,” “waste,” and “water” should be removed from the mouse-over text to be consistent with the actual topics listed in the “Environmental Basics” section. Not only will this improve consistency, but it will reduce any user confusion about the contents of this section. The mouse-over text should be reviewed whenever a new site is added to the *Student Center* to ensure that the text remains accurate. In addition, the “About EPA” section of the site contains two different links to the same Web site: “EPA Region” and “Regional Office Locator” link the user to the same EPA regions map. One of these links should be removed.

The *Student Center* should be reviewed to ensure that all linked sites have been assigned to the correct categories. For example, the NOAA site, “Clean-up for Kids,” is listed under “Water,” but should also be listed in the “Environmental Projects” section. As described earlier, pesticides sites (currently in the “Health” page) should be cross-referenced under another topic if possible.

Consistent naming protocols should be used in the Web sites so that the user never has to wonder whether different words mean the same thing. One naming protocol inconsistency was spotted in the *Student Center*: the page heading for the Index, which reads “Index to the Students Page,” should be changed to “Index to the *Student Center*.”

There are not many “formal” Internet standards that all Web sites adhere to, but the *Student Center* does conform to those few that do exist. The *Student Center* follows the Internet conventions of using blue for links to pages that have not been viewed by the user and red or purple for pages that have been seen. In addition, the site follows the practice of linking on the name of a web site, publication, or conference, rather than on a generic description of that item.

In order to ensure the on-going consistency of the *Student Center*, the site should be monitored and updated on a regular basis, and the date of the most recent update should be recorded on the site.

Aesthetic and Minimalist Design

A good web site should have aesthetic appeal and a crisp design that is unhampered by moving images, overwhelming colors, or irrelevant information and features.

Most of the student test participants either liked the design of the *Student Center* or at least thought that it was “okay.” They particularly liked the globe graphic in the center of the home page and several commented that they would

like to see more graphics in the site. As described previously, some participants suggested adding graphics to the left and right side-bars to help the user understand what information these topics contain and to add an element of interest to the site. One high school participant commented that the graphics on the site are “functional - nothing real fancy,” and that the design is a bit out of date (“it looks 1996, but it works”). He recommended a trendier color for the home page background (perhaps white instead of black), and said that animation would be nice but that it probably would not work well on slower computers. Another high school participant stated that he does not care about the site design because he is more interested in finding a lot of information on the site.

These comments seem to indicate that the *Student Center* design works well as it is. While some students would appreciate a more modern design and more graphics, they are generally happy with the current look of the site. Any additional graphics would need to be carefully reviewed to ensure they serve a purpose and do not clutter up the site.

There are a few design changes that would enhance the site. For example, as described earlier in the section on “Recognition Rather than Recall,” the left side-bar topics would be easier to spot if they are presented in a larger, clearer font. The bottom links are too prominent given their relative importance on the page, and should be made smaller. Finally, when printing the *Student Center*, the left side-bar does not print out clearly. This problem can be resolved by making separate images for each left side-bar and mouse-over label, using for example, use a blue rectangle with white text.

User Control and Help

A Web site should assist the user in recognizing, diagnosing, and recovering from errors, and should provide succinct help information. One way to provide user control is to provide a means for the user to ask for help. The “Comment” section of the *Student Center* allows the user to send an e-mail to EPA to ask questions about the agency or the environment. This section could be rewritten to let the user know that s/he can also contact EPA if s/he has questions about using the site. As described earlier, changing the name of this section to “Contact Us” would provide a clearer indication that this is the place to go for questions or help of any kind.

Another way to provide user control and freedom is to notify users when they are leaving EPA. The *Student Center* accomplishes this by locating green “Exit EPA” markers next to each link to an outside site. In most cases, the user is taken directly to the outside site, but when clicking on the link for the Environmental Careers Organization site (in the “Careers, Internships & Scholarships” section, the user is brought to an interim page that again notifies him/her that s/

he is about to go to this site. This redundancy is inconsistent with most of the other outside links and probably is not necessary. All of the links to non-EPA sites should be reviewed for consistency and to ensure that “exit EPA” markers are not missing.

Because the EPA *Student Center* is a portal site, most of the links are to EPA sites outside the Center. This situation can potentially confuse users if they do not realize that they have left the *Student Center* and then cannot find their way back to the site. The EPA *Student Center* contains a feature to help users find their way back to the Center - a “Click Here to Return to the *Student Center*” frame at the bottom of most of the EPA web sites. The student participants did not experience difficulties returning to the *Student Center* home page after visiting a different EPA site. However, it is interesting to note that they usually got back to the home page by clicking the back button several times and rarely, if ever, clicked on the “Return to the *Student Center*” frame. While many users may habitually click the back button and would not use a return frame, it is also possible that the participants just did not notice the frame. It should be made more visible by either creating a larger frame or possibly moving it to the top of the page.

In any event, the *Student Center* site should be reviewed to ensure that all pages of all outside sites contain the frame. Our review of the site indicated that the frame is missing from the “Environmental Atlas,” “Zip Code,” and “AIRNOW” web sites. It might also be helpful to add a “remove frame” option so that the user can delete the frame from a particular site if s/he finds it annoying.

Accessibility to Disabled Users

Web sites should be accessible to people with disabilities, including those who are blind, color blind, deaf, or have cognitive disabilities. This report summarizes the findings of a cursory review of the *Student Center* in order to identify the most obvious ways by which the site can be made more accessible. A more complete assessment should be made by reviewing the EPA Web site on accessibility (see Section 508 Guidelines at <http://Intranet/Accessibility/>).

The most common method of ensuring that a site is accessible to visually impaired users is to provide alternative text markers to describe all images, graphical buttons, image maps, and other non-text features on the site. Alternative text needs to be added to the *Student Center*. Another way of providing accessibility to visually impaired users is to create text-only pages for the site. While there is a “text version” link on the home page of the *Student Center*, it brings the user to the site index, not a text version of the site. If a text version is desired, it should provide a complete text alternative to all pages of the *Student Center* and should be updated whenever the site is updated. If it is not desired, the link should be deleted. In either case, alternative text markers should be used.

Certain colors and color combinations are difficult for color-blind users to differentiate. The *Student Center* should be assessed to determine if the lettering used on the globe graphic, and the dark blue lettering on black that is used for the titles of the main topic pages are visible to color-blind users. In addition, color coding should not be used to convey information on a web site. This does not appear to occur in the *Student Center*. Any changes made to colors in the site should be reviewed for possible visibility problems.

In addition, Web sites should avoid distracting elements by minimizing the use of moving, blinking, scrolling, or auto-updating objects or pages and/or ensuring that these features can be paused or stopped. As described in previous sections of this report, the *Student Center* does not contain this type of distracting feature.

Finally, the *Student Center* site can be reviewed using an accessibility software program such as “Bobby” (www.cast.org/bobby) in order to identify other ways to make the site more accessible to disabled users. A quick review of the *Student Center* using Bobby did identify the lack of alternative text as a “priority 1” problem, and suggested some technical issues that should be checked.

3.4 Content

The EPA *Student Center* directs its student users to a great deal of information about EPA and environmental issues. For the most part, the student participants found the site contents to be informative, useful, and easy to understand. While a Web site’s content can be evaluated according to a number of criteria, this section focuses only on those criteria that reveal the potential for site revisions: the purpose, target audience, coverage, and accuracy of the site.

Purpose and Target Audience

The purpose of a site should be clearly described and located in a highly visible location, and the target audience for the site should be apparent. This information appears in the mouse-over introduction on the *Student Center* home page. As described in a previous section, the introduction should be placed in a permanent location on the home page, and a Site Overview section should be added that describes the purpose and target audience in more detail.

Coverage

The breadth and depth of the information provided in a Web site should be appropriate to the site’s purpose and target audience. The *Student Center* is targeted toward students ranging in age from about 11 to 18. Consequently, most users will find that some information is too easy and some is too difficult. While it is not possible or desirable to make all sites equally appropriate for all

users, it would be helpful to provide easier versions of certain sites. For example, most of the middle school students found the EPA mission statement (in the “About EPA” section) to be confusing, and one high school student commented that it is very vague. It would be helpful to add or write a section about EPA that explains in clear, concise terms the Agency’s specific purpose and functions. Similarly, it would be helpful to add an environmental law section that briefly summarizes each law and then provides a link to the more technical descriptions that are currently in the site.

When asked what changes they would make to the *Student Center*, the high school user test participants responded that they would like more information for use in completing class assignments, reports, research papers, and projects. They specifically cited the need for more graphs, statistics, maps, and information summaries. One student requested more games. The EPA Access Workgroup has already developed a list of gaps in the *Student Center*. The following list represents some additional ideas based on the preliminary assessment and user test results:

- Expand the “Environmental Basics” Section. This section provides an opportunity for the user to get a good overview of all the different environmental issues and how they relate to each other. While the “Guide to Environmental Issues” site provides an in-depth look at these issues, a more concise overview would be helpful. If such a document does not already exist, perhaps it could be written specifically for the *Student Center*. A related idea is to add an interactive ecological footprint tool that shows students the environmental effects of their daily activities and provides links to information on how to reduce these impacts.
- Add More Science Experiments and Practical Activities. The “Environmental Club Projects” section of the *Student Center* should be expanded to include links to sites that provide good ideas for science fair projects and other hands-on science activities. This would involve identifying and linking to the science fair sections of sites that are already included in the *Student Center*, as well as finding new sites. Ideas for activities for helping students learn about or improve the environment could range from specific suggestions on how to recycle things at home and school to links to sites that provide community service project opportunities relating to the environments.
- Expand the “Ecosystems” Section. The term “ecosystem” is loosely defined on the “Ecosystem” page. In addition to providing a more concise definition, it would be helpful to find some sites that describe more fully what an ecosystem is and provide examples of different types of ecosystems.

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- Expand the “Careers, Internships & Scholarships” Section. According to the Webtrends analysis of the *Student Center* for December 2000 through February 2001, “Careers, Internships & Scholarships” was one of the most requested pages in the site. While this section does contain information on environmental careers, almost all the internship and scholarship information is for college students rather than middle school and high school students. It would be very helpful to identify Web sites that describe environmental internship, summer job, and volunteer opportunities for these younger students.
 - Identify sites that contain statistical information, maps, and graphs, etc. As described above, the high school participants would like to find in-depth environmental information that they can use for their school projects. It would be helpful to identify more sites that provide detailed information and environmental statistics that could be used for school reports.

Finally, if EPA hasn’t already done so, the Access Workgroup should work with EPA program offices and regional offices to identify, review, and improve sites that could be linked to the *Student Center*. For example, Region 1 and Region 7 have student’s pages, portions of which might be appropriate for inclusion in the *Student Center*. Usability assessments may be required on these sites to help determine if they are ready to be linked to the *Student Center*.

Accuracy

A Web site should provide information that is accurate and free of both substantive and grammatical/spelling errors. The portal portion of the *Student Center* appears to provide information that is substantively accurate and appropriate for its users. The accuracy of the sites outside the portal site is tracked by the Access Workgroup, which follows an established system for evaluating potential sites. The *Student Center* should also be reviewed periodically for misspellings, grammatical errors, and format issues. The preliminary assessment revealed some minor mistakes. For example, in the “Conservation” page, the description of the “EPA & Bird Conservation” site reads “Learn aboutbird conservation,” and the wrong font size is used in the description of the “Year of the Ocean Kids Page.”

3.5 Summary

Exhibit 6 combines all the usability criteria and scores the key indicators of each criterion according to whether it is of “No/Limited Concern,” “Moderate Concern,” or “Major Concern.”

Exhibit 6 – Evaluation: Usability Do's and Don'ts

Usability Criteria/Do's and Don'ts	No or Limited Concern	Moderate Concern	Major Concern
Site Accessibility			
Do: Link Site to Many Key Words and Phrases		✓	
Register with Commercial Site Engines			✓
List Site with Other Educational Resource Sites			✓
Create Visible Links from Other Sites			✓
Publicize Site			✓
Make Site Accessible from EPA Home Page			✓
Form and Functionality			
Navigability			
Do: Provide a Site Overview			✓
Provide a Site Map			✓
Provide a Search Engine			✓
Identify and Link Back to Home			✓
Provide Headings on Every Page			✓
Check for Broken, Incorrect, and Orphan Links	✓		
Don't: Make People Scroll			✓
Recognition Rather Than Recall			
Do: Make Options Visible		✓	
Use Clear, Legible Color Combinations and Font Sizes		✓	
Make Each Button's Purpose Clear			✓
Use Pop-Up Descriptions/Mouse-Overs Where Appropriate			✓
Provide Multiple Access Points to Information		✓	
Don't: Use Graphics as Labels	✓		
System/Real World Match			
Do: Define Technical Terms		✓	
Provide a Glossary of Terms		✓	
Define Terms/Metadata in Tables	✓		
Don't: Use Technical Jargon	✓		
Consistency and Standards			
Do: Adopt Consistent Design Features/Interface Elements		✓	
Use Consistent Terminology and Labels		✓	
Classify Information Consistently and Correctly		✓	

Exhibit 6 – Evaluation: Usability Do's and Don'ts (continued)

Usability Criteria/Do's and Don'ts	No or Limited Concern	Moderate Concern	Major Concern
Consistency and Standards (continued)			
Do: Use Consistent Naming Protocols		✓	
Use Standard Colors for Links	✓		
Use Publication Titles for Links	✓		
Don't: Forget to Update	✓		
Aesthetic and Minimalist Design			
Do: Provide an Age-Appropriate Design		✓	
Ensure Pages Print Out Legibly		✓	
Don't: Clutter Page with Too Many Links	✓		
Use Frames	✓		
Use Moving Images	✓		
Include Irrelevant Information	✓		
Use Overwhelming Colors	✓		
User Control and Help			
Do: Provide Contact Information		✓	
Use Exit Markers at Links That Go Off-Site		✓	
Provide a Means for Users to Return to Site		✓	
Accessibility to Disabled Users			
Do: Provide Alternative Text Markers			✓
Update Text Pages			✓
Use Color Combinations That Color-Blind Users Can Detect		✓	
Review Site for Accessibility		✓	
Don't: Use Color Coding	✓		
Use Distracting Elements	✓		
Content			
Do: Describe the Site's Purpose and Target Audience			✓
Provide Appropriate Breadth and Depth of Information			✓
Provide Accurate Information	✓		
Review for Grammar and Spelling Errors		✓	
All Criteria	15	18	17

4.0 ANALYSIS OF LINKED SITES

While the main objective of the usability analysis is to review the portal portions of the *Student Center* and develop recommendations for improving these sections of the site, it is also important to assess the linked sites. It was impossible to conduct an analysis of all 44 sites that can be accessed through the *Student Center*. Nevertheless, the student participants did comment on nine sites that they had the opportunity to visit during the user testing sessions. Their comments are summarized in Exhibit 7.

As shown in the exhibit, the students expressed some level of criticism for all nine of the sites and made positive comments about only four of the sites (“Municipal Solid Waste Factbook,” “Water Where You Live,” “Recycle City,” and “EPA Inspector”). The students appeared to have trouble navigating in at least four of these sites (“Ozone Depletion,” “Environmental Careers Resource Guide,” “Water Where You Live,” and “Environmental Atlas”); they were able to find the site, but then could not find the specific information requested in the task question. They also noted other problems, including the desire for more graphics, larger font size, less complicated text, and more recently updated data.

It is clear that the success of the *Student Center* depends on both the usability and content of the linked sites. The students’ comments about the sites they visited suggests the need to perform usability assessments on many or all of the existing linked sites, as well as on any sites that are being considered for inclusion in the *Student Center*.

Exhibit 7 – Student Center Linked Sites: Test Participants’ Comments

Linked Site Name	EPA Official Other Agency	Site Location	Number of Participants Who Commented	Comments
Environmental Careers Resource Guide*	Region 9	Careers, Internships & Scholarships	4	<ul style="list-style-type: none"> Found the site but couldn't find the answer. Wondered what "conscience" means in quote from employee that he wanted a job that was "easy on my conscience."
Environmental Atlas*	Environmental Quality (CEIS)	In Your Neighborhood Air Environmental Basics	1	<ul style="list-style-type: none"> The maps are hard to read - the print is very small. Hard to find the answer once at the site.
EPA Inspector*	EPA Region 7	Fun Activities	1	<ul style="list-style-type: none"> Game was interesting and provides information. Liked the options you got if you want to be an inspector. Liked that you can keep going if get the right answer. Too much reading involved (a little boring). It would be more interesting if there was some way to track your progress during the game. For example, if you earned and lost money with correct and incorrect answers.
Municipal Solid Waste Factbook*	Office of Solid Waste/OSWER	In Your Neighborhood Waste & Recycling or Conservation	4	<ul style="list-style-type: none"> Very nice site, with information, pictures, statistics, and graphs. Print at bottom of page is very small and hard to read. Chapter descriptions are not very clear. Had no problem reading the tables but the graphics are a little dated.
Ozone Depletion*	Office of Air & Radiation	Air	4	<ul style="list-style-type: none"> Found a lot of information about ozone, but could not find specific answer to task. A background graphic would be helpful. Page is "too scientific" and above the middle school student's level. The answer was easy to find.
Recycle City*	EPA Region 9	Fun Activities Waste & Recycling Conservation	2	<ul style="list-style-type: none"> Didn't really understand how to play. Took a long time to actually play Directions are easy. Like it as is.
Water Where You Live*	Office of Water	In Your Neighborhood Water	2	<ul style="list-style-type: none"> Liked the map. Site should be updated, last revision was 1/21/00 Beach closing information not current. Got to site and list of beaches but couldn't find beach closing information. Might return to <i>Student Center</i> to look at Beach Report.
What on Earth?*	NASA	Fun Activities	2	<ul style="list-style-type: none"> Site didn't tell why answers were right or wrong. Didn't learn anything. Couldn't exit or go back to view other games or activities. Page did not load initially. Game was hard - would prefer a math game. Not much fun.
What is a Pesticide?*	Office of Pesticide Programs	Human Health	2	<ul style="list-style-type: none"> Would like more graphics and less text. Long wait for page to download. Not familiar with all the terms on the site (translated some to Spanish).

*Sites where students' comments indicate possible need for further usability assessment

5.0 RECOMMENDATIONS

The specific recommendations described in the previous sections for improving the usability of the EPA *Student Center* are summarized below.

5.1 Increase Site Accessibility

- a. Add key words to meta tags and/or change order of existing key words by putting the substantive topics (e.g., air, water, recycling) first.
- b. Register the *Student Center* with more commercial search engines.
- c. Include links to the *Student Center* in other environmental education sites and student homework sites.
- d. Publicize the site to educators and students by sending notices to schools, teacher associations, and environmental education organizations.
- e. Review Headquarters and Regional EPA Web sites to ensure they link to the *Student Center*.
- f. Ask other federal, state, and regional government environmental Web sites to link to the EPA *Student Center*.
- g. Increase the visibility of the *Student Center* link from the EPA home page by either adding a direct link to the *Student Center* or by improving the visibility of the “Audience Groups” label in the left side-bar and/or making its purpose more obvious. Also consider adding a link to the *Student Center* in the “Browse Topics” page.
- h. Increase the visibility and clarify the purpose of the *Student Center* links that are in the EPA *Explorers’ Club* and Environmental Education Web sites.

5.2 Revise Home Page and Second-Tier Page Structure (see Exhibits 8 and 9 for sample page layouts)

- a. Revisions to Home Page Only
 - i. Add a permanent version of the pop-up text introductory statement to the home page. Place it just under the “EPA *Student Center*” banner and above the globe.
 - ii. Expand the left side-bar on the home page to include all of the existing left side-bar headings (except “Teachers” and “Kids”) plus a “Site Overview” label.

Exhibit 8 – U.S. EPA Student Center Sample Home Page Layout



Banner:

EPA Student Center

Welcome to the Student Center! Here, students in middle and high school can explore a wide range of environmental issues. Need help with your homework? Need an idea for an environmental club project? You've come to the right place! Learn about your environment and how you can help protect it for the future.

Left Side-Bar:



[Student Center Home](#)

[Index](#)
[Site Overview](#)

[About EPA](#)
[Dictionary](#)
[Environmental Laws](#)
[In The News](#)
[EPA Publications](#)



Right Side-Bar:



[Careers, Internships & Scholarships](#)

[Env. Youth Awards](#)

[Env. Club Projects](#)

[Fun Activities](#)



Enter Keyword to Search:

[Search](#) | [Index](#) | [Contact Us](#)
[Student Center Home](#) | [Office of Env. Educ. Home](#) | [EPA Home](#)

Exhibit 9 – U.S. EPA Student Center Sample Second-Tier Page Layout



Banner:

EPA Student Center

Heading:

Ecosystems

Sub-Headings:

[Ecology](#)

[Habitats](#)

[Endangered Species](#)

Left Side-Bar:

[Global Warming](#)

[Watersheds](#)



[Student Center
Home](#)

Index

Site Overview

About EPA

Dictionary

Environmental Laws

In The News

EPA Publications

Environmental Basics

Ecosystems

Water

Human Health

In Your Neighborhood

Waste & Recycling

Air

Conservation



[Search](#) | [Index](#) | [Contact Us](#)

[Student Center Home](#) | [Office of Env. Educ. Home](#) | [EPA Home](#)

-
- iii. Add a search engine function that allows the user to type a search term directly into a box on the home page without having to click on the search engine link.

b. Revisions to Second-Tier and Subsequent Pages Only

- i. Expand the left side-bar to include all of the existing headings (except “Teachers” and “Kids”) plus “Site Overview” and the eight main topic headings that are on the center globe.
- ii. Create sub-headings at the top of each second-tier page that link to a related subsection further down the page. As the site expands in size, it may become necessary to create a tertiary-level page for each sub-topic, add an alphabetical listing of all topics (such as the “Browse EPA Topics” section in the EPA home page), and/or possibly create a searchable database.

c. Revisions to All Pages

- i. Create a consistent banner (“EPA *Student Center*”), main heading (e.g., “Ecosystems”) and sub-headings (e.g., “Ecology,” “Habitats,” “Endangered Species,” “Global Warming,” and “Watersheds”) on every page.
- ii. Add a “*Student Center Home*” button to the top of every page (not necessary on the home page).
- iii. Make the EPA logo that appears on every page a link to the EPA home page.
- iv. Make the *Student Center* banner that appears on every page a link to the *Student Center* home page.
- v. Revise the bottom links to include the following: “Index,” “Search,” “Contact Us,” “*Student Center Home*,” “Environmental Education Home,” “EPA Home.”
- vi. Reduce the size of the bottom links and separate them with brackets [] or lines.
- vii. Enhance the visibility of the left side-bar by increasing the font size and selecting a clearer font.
- viii. Add pop-up, mouse-over text for each topic in the left side-bar.
- ix. Consider adding a small graphic next to each label in the left side-bar.

-
- x. Remove the “Students and Teachers” button that is currently on the top right side of each page.
 - xi. Place the links to the *Explorers’ Club* and Environmental Education Web sites on separate buttons, star bursts, or graphics below the left side-bar and change the label so it is clear that these are sites outside the *Student Center*.

5.3 Improve Site Navigability

a. Add a “Site Overview” or “Getting Started” Section that:

- i. Describes the *Student Center*’s purpose, authority (i.e., EPA), target audience, type of information in the site, and how to find information.
- ii. Discusses the fact that it is a portal to other EPA and government sites and that companion sites for kids and teachers are also available references.

b. Improve the Site Index

- i. List alphabetically all the topics and sub-topics that are included in the center globe graphic.
- ii. List left and right side-bar topics alphabetically, but keep separate from each other and from the globe topics.
- iii. Remove the phrase “U.S. EPA *Student Center*” from each line of the Index.
- iv. Move the heading “EPA *Student Center*” to the top of the page.

c. Improve the Search Engine

- i. Provide links to specific Web sites rather than to the more general pages within the *Student Center*.
- ii. Search an entire site for the search term, rather than just the site’s title.
- iii. List each hit on one, rather than two, lines (the URL can be placed in parentheses in a small font size directly after the web site title).
- iv. Delete the phrase “US EPA *Student Center*” and any other irrelevant information from each line of the search results.

-
- v. Add a search engine function to the home page so the user can immediately type in a search term without clicking on the link to the search engine.

5.4 Improve Links

- a. Review the *Student Center* site for broken and incorrect links (software programs are available for this purpose).
- b. When bulleted lists are used (e.g., on second-tier pages that list environmental Web sites), place the link on both the bullet and the site name.

5.5 Improve Consistency and Standards

- a. After revisions are made to the site structure (see above), the entire site should be reviewed whenever new sites are added or other changes are made to the *Student Center*, to ensure that all banners, headings, sub-headings, and features are consistent across the site. The date of the most recent update should be recorded on each page.
- b. Ensure that all mouse-over text is consistent with the section of the site to which it refers (e.g., the terms “air,” “waste,” and “water” appear in the mouse-over text for the “Environmental Basics” section, but the section does not contain links to sites that are specifically about these topics).
- c. Review the site to ensure that linked sites are assigned to appropriate sections and that the mouse-over description of each site clearly matches its section topic. For example, the “What is a Pesticide” site is listed in the “Human Health” section. While this is an appropriate topic for the particular site, it may not be intuitive to all users. Perhaps it could also be listed in the “Ecosystems” section. In addition, if a new site about pesticides is added to the *Student Center*, it may be more appropriate in a different section of the *Student Center*.
- d. Remove one of the links to the EPA regions map from the “About EPA” section of the *Student Center*.
- e. Check the site for consistent naming protocols (e.g., reference to the “Index to the Students Page” should be changed to “Index to the *Student Center*”).
- f. Review the site to ensure that no “Return to *Student Center*” frames are missing. Frames are currently missing from the “Environmental Atlas,” “Zip Code,” and “AIRNOW” Web sites. Be sure to check all pages of each linked site.

-
- g. Review *Student Center* to be sure “exit EPA” markers are not missing and that they are consistent. The link to some sites (e.g., the Environmental Careers Organization site) goes to an interim page that notifies the user that s/he is about to leave EPA, while the other “exit EPA” markers (e.g., History of the Natural Resources Conservation Service) bring the user directly to the outside site.
 - h. Maintain consistency with the EPA *Environmental Education Center* to the extent possible.
 - i. Monitor and update the *Student Center* on a regular basis and whenever new sites are added or other revisions are made. Be sure to record the date of the most recent update.

5.6 Clarify Terminology

- a. Define important environmental concepts, such as “ecosystems,” “global warming,” and “acid rain,” where they occur in the site (e.g., the introduction to a section and/or the link description).
- b. Link each complicated environmental term to its definition in the “Terms of the Environment.”
- c. Add a description of the “Terms of the Environment” site to its link in the “Environmental Basics” section of the *Student Center*.

5.7 Enhance User Control/Help

- a. Change name of “Comment” section to “Contact Us” and add the opportunity for the user to ask questions about how to use the site.
- b. Enhance the visibility of the “Return to *Student Center*” frame, either by creating a larger frame, using a brighter color, or moving the frame to the top of the page.
- c. Consider adding a “remove frame” option to the “Return to *Student Center*” frame for those users who wish to delete the frame.

5.8 Assess Accessibility to Disabled Users

- a. Review the site to ensure it is in accordance with EPA’s guidelines for accessibility (see Section 508 Guidelines at <http://Intranet/Accessibility/>).

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- b. Review the site using an accessibility software program, such as Bobby (www.cast.org/bobby), to identify ways to make the *Student Center* more accessible to disabled users.
 - c. Add alternative text markers to all images, graphical buttons, image maps, and other non-text features.
 - d. Update the text version of the *Student Center* so that it provides a text version of the entire site. Alternatively, rely on the text markers for this purpose and delete all “text version” links from the *Student Center*.
 - e. Review the color combinations used in the *Student Center* (particularly the dark blue lettering on a black background that is used for the main topic page titles) to ensure these are visible to color-blind and visually impaired users.

5.9 Enhance Site Design

- a. Select larger and clearer font for left side-bar labels and a clearer font for the page maintenance information located at the bottom of each page.
- b. Consider updating the design by using “trendier” colors or more graphics, as long as the colors are not overwhelming and the graphics serve a purpose and do not clutter the page.
- c. Make new images for the left side-bar and mouse-over labels so that they will print out clearly.

5.10 Evaluate Technical Problems

- a. Test the *Student Center* on older, slower computers to determine if the problems experienced by high school test participants in downloading the left and right side-bars occur on other computers.
- b. Review “What is a Pesticide?” and games to see if slow download time can be improved.

5.11 Add Content

- a. Revise the left side-bar sections of the *Student Center* that are too difficult for younger site users, and provide a simplified version with a link to the more complicated site. For example, add a brief section under “About EPA” that summarizes EPA’s purpose and links to the existing “EPA’s Mission” site, develop a simplified summary of the main environmental statutes, and

write a shorter description of major environmental issues, which can then link to the “Guide to Environmental Issues” for more details.

- b. Consider rating each linked site according to whether it is easy, moderate, or difficult to understand (or contains easy, moderate, or complex information).
- c. Expand the “Environmental Basics” section to provide a better overview of the different environmental issues and how they relate to each other. This could be accomplished by linking to an existing Web site or writing a new section for the *Student Center*. Consider adding an interactive ecological footprint tool to illustrate these environmental concepts.
- d. Expand the “Environmental Club Projects” section by adding sites with science experiments and other practical activities that students can perform to learn about the environment. This should include reviewing the *Student Center* to identify existing sites that contain science experiments and linking to these sites from the “Environmental Club Projects” section. Consider changing the name from “Environment Club Projects” to “Environmental Projects and Experiments”.
- e. Expand the “Ecosystems” section by providing a clear definition of the term “ecosystem” and finding additional sites that illustrate different types of ecosystems.
- f. Expand the “Careers, Internships & Scholarships” section to include more information that is relevant to middle school and high school students.
- g. Add more sites that contain statistical information, maps, graphs, etc. that students can use in their research projects.
- h. Review EPA Headquarters and Regional Office Web sites to identify potential sites to be added to the *Student Center*.

5.12 Review for Accuracy

- a. Periodically review the *Student Center* for grammar and spelling errors. Errors in the current site include: 1) in the “Conservation” page, the description of the “EPA & Bird Conservation” site reads “Learn aboutbird conservation,” and 2) the wrong font size is used in the description of the “Year of the Ocean Kids Page.”
- b. Continue existing system for evaluating sites before adding them to the *Student Center*, to ensure accurate content.

5.13 Perform Additional Usability Testing

- a. After the site has been revised, perform another round of usability testing to assess the success of the changes, and determine if additional revisions are required.
- b. Work with EPA program offices and regional offices to identify additional sites to be included in the *Student Center* and assess their usability.
- c. Perform usability analysis on some of the sites already included in the *Student Center* to enhance their usefulness and understandability for the student users.

APPENDIX 1

EPA *STUDENT CENTER* USER TEST FORMS

Date _____ Time _____ Participant Name _____

EPA Student Center Web site Usability Test
Participant *Entry* Questionnaire

1. *What grade are you in?*
☐ Eighth ☐ Ninth Other _____ (please specify)

2. *Please describe your level of experience using World Wide Web:*
☐ beginner ☐ intermediate ☐ advanced

3. *On average, how often do you use the World Wide Web (not including e-mail)?*
☐ less than once a week ☐ once a day
☐ less than once a day ☐ more than once a day

4. *How would you describe the connection speed you typically have to the Web?*
☐ slow ☐ fast ☐ what kind of connection do you have?

5. *Have you ever use the EPA Student Center Web site?*
☐ yes ☐ no

6. *What are three things you would expect to find on a site called EPA Student Center?*

Date _____ Time _____ Participant Name _____ (optional)

EPA Student Center Web Site Usability Test
Participant Post-test Questionnaire

1. Were the task questions you completed the type of information you would come to the EPA Student Center Web site to look for?

_____ Yes _____ No

2. Did you use the search tool?

_____ Yes _____ No

3. What information would cause you to return to the EPA Student Center Web site?

_____ identify Nothing at all, would not return

4. When I was performing a task I,:

_____ Felt Lost _____ Felt I knew where I was

5. After performing the test how easy or difficult do you think it would be for you to find information that interest you on the EPA Student Center Web site?

_____ Easy to Find _____ Difficult to Find

6. *The Home-Page was structured in a way that made it easy to find information:*

_____ All of the time _____ Most of the Time _____ Some of the Time _____ Never

7. *Information flowed logically from page to page*

_____ All of the time _____ Most of the Time _____ Some of the Time _____ Never

8. *I would like the EPA Student Center Web site:* _____

OBSERVER NOTES

Web Site: *EPA Student Center*

High School

Date: June 6, 2001

Observer Name: _____

Observer Phone Number: _____

Observer E-mail _____

Participants Name: _____

Browser Used : Netscape or Explorer

It is absolutely necessary that you do not offer any comments or assistance unless necessary.

If you are having a problem or your participant is having a problem please flag down the moderator.

Focus Group Question 1.

Focus Group. If you were looking for environmental information for a school project or for fun, how would you begin your Internet search?

--What search engines do you like to use?

--What search terms would you use?

Verbal Comments:

TASK 1

Please go to the EPA home page at www.epa.gov. Can you find the EPA *Student Center* Web site from this page?

Note to Observers: If student has trouble finding the Student Center from here, ask him/her to suggest ways EPA might make it easier to find the Student Center Web site

Path/Destination URL/Answer:

www.epa.gov/students/

Please check off the following behaviors of the participant & note other behaviors, which may not be included in this list.

User Comments/Attitude

☐ Annoyed ☐ Frustrated ☐ Confusion ☐ Effortless

☐ "BACK" Button use ☐ "STOP" Button use ☐ Search Too use ☐ False Start

Graphics (comments made):

Disappointment (comments made):

Technical Difficulties

☐ Broken Link ☐ Long-wait for pages to load

☐ Page did not load ☐ Other Web Site Errors : _____

Task competed _____ Yes _____ No

TASK 2

Please look for information describing EPA's main purpose.

***Note to Observer:** If users have trouble finding answers because they look only in the globe graphic in the center of the home page, ask if there is something that could help them spot these "side-bar" topics more quickly*

Path/Destination URL/Answer:

www.epa.gov/students/epas_mission.htm

"About EPA" (on left side-bar)

Click on "EPA's Mission"

TASK 3

Your teacher has asked you to write a research paper about the ozone layer. Can you find a site that will tell you the function of the ozone layer and how it performs this function?

Path/Destination URL/Answer:

www.epa.gov/students/ozone_depletion.htm

"Air" page of *Student Center*

"Ozone Depletion" Web Site

Click on "Questions & Answers"

First Question/Answer

OR

www.epa.gov/students/missing_ozone.htm

"Air" page in *Student Center*

“On the Trail of the Missing Ozone” Web site

Go to page 3 of the site

TASK 4

Let’s say you are interested in a career as an environmental scientist. Find information on this career, including how much money you could earn as a scientist working in an environmental area?

Path/Destination URL/Answer:

www.epa.gov/students/environmental_careers_resource.htm

“Careers, Internships & Scholarships” (on right side-bar)

Click on “Environmental Careers Resource Guide”

click on “Fact Sheets - Environmental Careers in Science”

Answer: Entry level positions earn salaries starting at \$23,000 a year, depending on experience, with the potential of earning \$50,000 or higher.

TASK 5

Look for information about a beach in Maryland and see if it has been closed due to pollution.

Path/Destination URL/Answer:

<http://yosemite.epa.gov/water/beach2000.nsf/CountyMap/24003>

“In Your Neighborhood” OR “Water” (on the globe graphic)

Click on “Where You Live”

Click on map of Maryland

Click on “Beach Watch”

Select any yellow county area

Select a beach

Read “Monitoring” and “Advisory/Closing” information

Answer: depends on the beach selected.

TASK 6

Find a science experiment that helps you learn about how oil spills occur and how to clean them up.

Note to Observers: Ask participant if it would be helpful to add a section on science fair project/science experiment ideas.

Path/Destination URL/Answer:

<http://response.restoration.noaa.gov/kids/kids.html>

“Water” OR “Ecosystems” (On the globe graphic)

Click on “Cleanup for Kids”

Go to “Especially for Kids -Experiments You Can Do”

Click on “Sediment Penetration Exercise”

TASK 7

How much garbage was generated in the U.S. during 2000?

Path/Destination URL/Answer:

www.epa.gov/students/municipal_solid_waste_factbook.htm

“Waste & Recycling” (on the globe graphic)

Click on “Municipal Solid Waste Factbook”

Click on “Table of Contents”

Scroll to Chapter 6 or 7

Click on “Tons per Year & Pounds per Capita” in Chapter 6 OR “Disposal in Millions of Tons per Year” in Chapter 7

Interpret Graph

Answer: 221.7 million tons

TASK 8

Find a map of the U.S. that displays the concentration of sulfur dioxide (SO₂) in the air in 1996.
Did the D.C. area meet the National Ambient Air Quality Standards (NAAQS) in 1996?

Path/Destination URL/Answer:

www.epa.gov/eq/atlas/nationalatlas/sulfur_dioxide.htm

“Air,” “Environmental Basics” OR “In Your Neighborhood” (on globe graphic)

Click on Environmental Atlas

Click on USA Maps

Click on Air

Click on Air Quality

Click on Sulfur Dioxide

Interpret the first map on the page (it shows the highest second maximum 24-hour SO₂ concentration by county for 1996).

Answer: yes

Note to Observers - ask the participants:

--How easy or difficult is it to read and interpret this map?

--Would it be helpful to include a separate section that clearly contains maps, charts, and other visual materials?

Focus Group/Observer Follow-up.

Now that you've had a chance to look at more of the EPA *Student Center* site, we'd like to know what you think about the site.

–Would you come back to the *Student Center* on your own?

–Why or why not?

For example:

–Is the *Student Center* easy to use?

–Did you understand how to find the information you were asked to look for?

--Did you usually feel as if you knew where you were in the site or did you feel lost a lot of the time?

–Do you have a good understanding of the type of information you can find on the site?

--Does the *Student Center* contain interesting and/or useful information?

--Do you like the design and the colors that are used?

–Do you like the graphics?

--Are the descriptions of each site that you can go to within the *Student Center* clear and complete?

–Do they give you a good idea of what each site will contain?

APPENDIX 2

***EPA STUDENT CENTER* USER TEST RESULTS**

Summary of Focus Group and User Test Results
EPA Student Center Web Site
Sandoval Elementary School, Chicago Illinois

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Pre-Test Questions						
Grade	7th	8th	7th	8th	8th	7th
WWW Experience	Intermediate	Beginner	Intermediate	Beginner	Beginner	Beginner
Freq. Of Use	< once/wk	<once/wk	<once/day	once/wk	<once/wk	<ul style="list-style-type: none"> • <once/wk when access is available • Uses the Web for homework and when has nothing else to do.
Connect Speed	Slow	Slow	Fast(?)	Slow	Slow	Fast
Used <i>Student Center</i> Site?	Yes	Yes	Yes	Yes	No	Yes, thinks so, but feels it did not give him a special advantage.
What would you expect to find on site?	NR	NR	NR	<ul style="list-style-type: none"> • Things about the environment • What stuff you can recycle. 	<ul style="list-style-type: none"> • Information about the earth. 	NR

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Post-Test Questions						
Were the task questions type of info you'd look for?	Yes	Yes	Yes	Yes	Yes	Post-Test form is missing.
Use Search Tool?	No	No	No	Yes	No	
What info would bring you back to site?	Depends on homework assignments	NR	• Volcanoes	• To try a new topic.	• The effects on the earth.	
How did you feel when perform-ing a task?	Lost	Lost	Lost	Lost	Lost	
Would it be easy or difficult to find info that interests you on the site?	Easy	Difficult	Difficult	Half way between easy and difficult.	Easy	
It was easy to find info on home page:	Most of the time	Some of the time	Most of the time	Most of the time	Most of the time	
Info flowed logically:	NR	Most of the time	Some of the time	All of the time.	All of the time	
I'd like the site to:	NR	NR	• More buttons	• More games	NR	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Focus Group Questions						
Browser	Netscape	Netscape	Netscape	Netscape	Explorer	Netscape
1. How begin search/favorite search engines and search terms?	<ul style="list-style-type: none"> • Yahoo • Never look for environmental information, except if sometimes work on science project. 	<ul style="list-style-type: none"> • Yahoo 	<ul style="list-style-type: none"> • No search engines. • Only uses location bar - types in addresses manually. 	<ul style="list-style-type: none"> • Yahoo (searches under topics) 	<ul style="list-style-type: none"> • Yahoo • Google • Search terms: water, air. 	<ul style="list-style-type: none"> • Yahoo • Doesn't look for environmental information very often. • Searched through topics and found "neighborhood environment" which seemed like a new idea to him.
2. How find site from EPA home page?	<ul style="list-style-type: none"> • Used history to get to EPA home page. • Scrolled home page but couldn't find Student site. • Looked in "Programs." • Found Kids Site. • Never found Student Site. 	<ul style="list-style-type: none"> • Could not find site from EPA home page. 	<ul style="list-style-type: none"> • Typed www.epa.com(?) • Confused about how to find Student site. • Found it after getting clues from the Observer. 	<ul style="list-style-type: none"> • Audience groups - Students - <i>Student Center</i> 	<ul style="list-style-type: none"> • From EPA home page: Kids - Kids site - Students • "It would have been very tricky to find it" 	<ul style="list-style-type: none"> • Found EPA home page by going to history of previous URLs (teachers had been on it). • Has been to the EPA home page before. • Found Student Site: EPA home page - Kids - Explorers Club site - <i>Student Center</i> link - <i>Student Center</i> site

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
3. Impressions of site	<ul style="list-style-type: none"> Design is interesting. Design is easy to use. 	<ul style="list-style-type: none"> Likes the subject categories Interesting 	<ul style="list-style-type: none"> Overall look is okay - not great. Would prefer all information in the center graphic, not in the sidebar. 	<ul style="list-style-type: none"> It names where to go. Easy to find topics. Like it as it is. Wouldn't change anything. 	<ul style="list-style-type: none"> Likes the site Easy to find (things?) Likes that it is divided into sections Likes that it has "Activities" section No suggestions to improve the site. 	<ul style="list-style-type: none"> Likes the look of the site. Initially thought that the topics were only those on the right sidebar. Once he noticed the topics on the globe, he found it clearly organized and easy to know where to go because of the mouse-overs for each topic button.
Other Comments	<ul style="list-style-type: none"> Participant seemed hesitant and shy about answering questions. 	<ul style="list-style-type: none"> Very shy. Seemed distracted by others in the room. Did not read/scan all the options before selecting one. Her reading ability was not clear, although sometimes she clearly understood what she was reading. 				<ul style="list-style-type: none"> Uses the Web for homework and when doesn't have anything else to do. Has been to the site before but doesn't feel it gave him a special advantage.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Task 1 - Your teacher has asked you to write a report about the ozone layer. Can you find a site that will tell you the function/how well it performs this function?						
General Paths Tried	<ul style="list-style-type: none"> Typed URLs into browser. Tried www.ozonelayer.com, www.layer.com, and www.ozone.org. Didn't find information. Left <i>Student Center</i> page. If doing this for school, would ask someone for help. 	<ul style="list-style-type: none"> Went to "Waste & Recycling.." 	<ul style="list-style-type: none"> Air-Ozone Depletion-Questions & Answers 	<ul style="list-style-type: none"> Got to Ozone Depletion but didn't click on it (?) Clicked on Human Health, but didn't find answer (wondered if it might be Ground Water Primer or the National Institute of Env. Health Science site) Back to Water Back to main page/Human Health 	<ul style="list-style-type: none"> Environmental Basics Ecosystems Human Health 	<ul style="list-style-type: none"> Looked at mouse-over descriptions under several Globe links. Air On the Trail of the Missing Ozone. Scrolled to bottom of page, chose Science of Ozone Depletion. Read through text and highlighted words. Clicked on topic about ozone recovery. Read paragraph.
User Attitude	--		<ul style="list-style-type: none"> Confusion Back button use 	<ul style="list-style-type: none"> Frustrated Confusion Back button use 	<ul style="list-style-type: none"> Confused, not sure where to begin. Back button use. 	<ul style="list-style-type: none"> Effortless
Graphics Comments	--		<ul style="list-style-type: none"> A background graphic on the site would be helpful. 			

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Disappointment Comments	--		<ul style="list-style-type: none"> The page was “too scientific” and not really at the participant’s level, but he felt he could find enough information for a report. 	<ul style="list-style-type: none"> Main page is confusing - found the mouse-over captions confusing. Disappointed she couldn’t find the answer. 	<ul style="list-style-type: none"> It was kind of tough. I couldn’t find what I was looking for. 	
Technical Difficulties	--					
Other Comments		<ul style="list-style-type: none"> Didn’t know how to use back button. 				<ul style="list-style-type: none"> Felt it was useful information. Language (acronyms and terms) was too hard, but seemed to understand much of it.
Task Completed?	No	No	Yes	No	No	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Task 2 - Please look for information describing EPA's main purpose and functions.						
Paths Tried	<ul style="list-style-type: none"> Went to "EPA Publications". Looked at all topics/descriptions on globe. Found "About EPA" on left sidebar. Found "EPA's Mission." Didn't seem to understand the mission statement very well. 	<ul style="list-style-type: none"> Environmental Basics - Terms of the Environment. Waste & Recycling. 	<ul style="list-style-type: none"> EPA Publications Comments Careers 	<ul style="list-style-type: none"> About EPA-EPA's Mission 	<ul style="list-style-type: none"> Student, Internships, & Scholarships 	<ul style="list-style-type: none"> Environmental Club Projects Waste & Recycling - Consumer Handbook
User Attitude	False Start		<ul style="list-style-type: none"> Confusion Back button use 	<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Confusion Back button use. 	<ul style="list-style-type: none"> Confusion
Graphics Comments			<ul style="list-style-type: none"> Would prefer that all information be in the center graphic. Never saw "About EPA" in the sidebar. 	<ul style="list-style-type: none"> Not enough graphics. 		
Disappointment Comments	<ul style="list-style-type: none"> Found it kind of complicated 				<ul style="list-style-type: none"> Thought Students, Internship, Scholarships would talk about why someone might want to work at EPA Didn't even think about the side-bar 	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Technical Difficulties						<ul style="list-style-type: none"> Wants to click on the bullets rather than the linked text.
Other Comments		<ul style="list-style-type: none"> Didn't seem to read the topics and descriptions very carefully. 		<ul style="list-style-type: none"> Very easy to find. Started jumping to other pages to look at, especially on recycling. 	.	<ul style="list-style-type: none"> Focused on EPA's job with waste management. Perhaps that is what they're studying. In his words, EPA's main purpose is to keep earth clean/to reuse, reduce, recycle.
Task Completed?	Yes	No	No	Yes	No	No
Task 3: Find information on career as environmental scientist, including salary you could earn.						
Paths Tried	<ul style="list-style-type: none"> Scrolled around globe, reading descriptions. Went to Conservation and read links. Reread the task question. Went to Human Health and clicked on NIEHS. Went back to Conservation. 		<ul style="list-style-type: none"> Careers, etc. Environmental Careers Organization site 	<ul style="list-style-type: none"> Environmental Laws (thinks it may have careers for lawyers) Home Page Globe graphic. 	•	<ul style="list-style-type: none"> Careers, Internships, Scholarships Environmental Careers Guide Environmental Career in Science
User Attitude	Back button use		<ul style="list-style-type: none"> Confusion 	<ul style="list-style-type: none"> Annoyed Confusion 	<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Effortless

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Graphics Comments				<ul style="list-style-type: none"> The boxes on right have no graphics. 		
Disappointment Comments				<ul style="list-style-type: none"> Disappointed because she couldn't find answer. 	<ul style="list-style-type: none"> It was okay. The careers were easy to find, but it was tougher to find the salaries. 	
Technical Difficulties						<ul style="list-style-type: none"> Funny dotted red lines in display at env.careersresource.htm
Other Comments	<ul style="list-style-type: none"> Seemed confused. "Didn't get it." Would ask for help next. Thinks site is okay. 	<ul style="list-style-type: none"> Does not seem to select buttons based on what they say. Seems more likely to choose buttons based on prior knowledge or their look. Does she read well enough to complete these tasks? 	<ul style="list-style-type: none"> Got stuck on the Ecological Careers page, which seemed the most logical choice for answering the question. Never found information on EPA careers. 	<ul style="list-style-type: none"> The Globe looks easier to find things in than the left side-bar. Never looked at the right side-bar topics for answer. 		<ul style="list-style-type: none"> Easily found both the site and the salary information. Wasn't sure what "conscience" meant in quote from employee that he wanted a job that was "easy on my conscience."
Task Completed?	No	No	No	No	Yes (first half of question)	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Task 4: Find a site that describes some common types of pesticides found at home.						
Paths Tried	<ul style="list-style-type: none"> • Checked the globe. • Checked Air. • Checked Waste & Recycling. • Checked Environmental Basics. • Looked at left side-bar. • Back to Waste & Recycling. • Back to Home. 	<ul style="list-style-type: none"> • Human Health - What is a Pesticide? 		<ul style="list-style-type: none"> • Human Health • Learn About Chemicals in Your Home • NIEHS link 	<ul style="list-style-type: none"> • Waste & Recycling • Home Page • Waste & Recycling • Human Health (Clicked on this twice, but did not see that Pesticides was a topic on this page. 	<ul style="list-style-type: none"> • Asked for definition of “pesticide” (knew it in Spanish). • Human Health (found the term pesticide in the mouse-over description) • Looked at links on this page for a while. • Finally clicked on “What is a Pesticide?” • (May have gone Home and then back to Human Health.)
User Attitude	<ul style="list-style-type: none"> • Frustrated • Back button use 	<ul style="list-style-type: none"> • Effortless 	<ul style="list-style-type: none"> • Effortless 	<ul style="list-style-type: none"> • Annoyed 	<ul style="list-style-type: none"> • Confusion 	<ul style="list-style-type: none"> • Confusion (about meaning of “pesticide.”) • Back button use.
Graphics Comments			<ul style="list-style-type: none"> • Would like more graphics and less text on the site. 			
Disappointment Comments			<ul style="list-style-type: none"> • Felt the sites were taking too long to download. 	<ul style="list-style-type: none"> • Worried that the link (to Learn About..) didn’t work, and didn’t know where to go from there. 	<ul style="list-style-type: none"> • It was kind of tough to find. 	
Technical Difficulties			<ul style="list-style-type: none"> • Long wait for pages to load. 	<ul style="list-style-type: none"> • Long wait for page to load. • Page didn’t load. 		

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Other Comments	<ul style="list-style-type: none"> Had seen pesticides info in Task 3 but didn't know how to get back to it. 	<ul style="list-style-type: none"> Observer noted that Moderator used term "health" in the task question, and that observer immediately went to Human Health. Participant said she chose "Human Health" because she associates health with her home. 	<ul style="list-style-type: none"> Got to the site, but exited after looking through the page. Eventually returned to the site. 			<ul style="list-style-type: none"> Wasn't familiar with all the terms on the site. Didn't think he has any of the products described in the site in his home.
Task Completed?	No	Yes	Yes	No	No	Yes
Task 8: Find an environmental game...Did you enjoy it?...Why or why not?						
Paths Tried	<ul style="list-style-type: none"> Went to "Fun Activities: Selected "What on Earth?" (NASA site) 	<ul style="list-style-type: none"> First went to "Air" Then to "Fun Activities" Selected "Recycle City" 	<ul style="list-style-type: none"> Selected "What on Earth?" (NASA site) 	<ul style="list-style-type: none"> Fun Activities Recycle City 	Recycle City	<ul style="list-style-type: none"> Fun Activities Read link descriptions Clicked on EPA Inspector
User Attitude			<ul style="list-style-type: none"> Annoyed Frustrated Confusion (these were because of the game itself.) Back button use 		<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Effortless

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Graphics Comments					<ul style="list-style-type: none"> • Pictures are colorful. • I like that the cars move. • It helps you to see how bad things are and how you can help out. 	
Disappointment Comments			<ul style="list-style-type: none"> • Site didn't tell why answers are wrong or right. • Didn't learn anything. • Site had problems - couldn't exit or go back to view other games or activities. 		<ul style="list-style-type: none"> • Once in Recycle City, didn't really understand how to play the game. • Took a long time to actually play. 	
Technical Difficulties	<ul style="list-style-type: none"> • Broken link. • Tried again and it worked. 		<ul style="list-style-type: none"> • Page did not load. • Other Web site errors. 			

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Other Comments	<ul style="list-style-type: none"> • Game was hard. • Not much fun. • Would prefer a math game. 			<ul style="list-style-type: none"> • Recycle City has easy directions. • She liked it as it is. • Would like games about recycling (where to separate stuff). 		<ul style="list-style-type: none"> • Game was interesting and provides information. • Liked the options you got if you want to be an inspector. • Liked that you can keep going if get the right answer. • It was fun, but not as fun as other games. • Too much reading involved (boring). • It would be more interesting if had some way to keep track of your progress in game. For example, if keep track of correct/incorrect scores, or earn money and watch it accumulate as you play, or bet your money on the questions, or compare your results with other kids.
Task Completed?	Yes	Yes	Yes	Yes	Yes	Yes

Summary of Focus Group and User Test Results

EPA Student Center Web Site

Wilson High School, Washington, D.C.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pre-Test Questions					
Grade	10th	11th	11th	11th	11th
WW W Experience	Advanced	Advanced	Intermediate	Advanced	Intermediate
Freq. Of Use	>once/day	>once/day	once/day	>once/day	once/day
Connect Speed	Fast (128 k)	fast (56 k)	fast	fast (cable modem)	slow
Used <i>Student Center</i> Site?	No	No	No	Yes	No
What would you expect to find on site?	<ul style="list-style-type: none"> • Information about the environment • How to protect the environment • Statistics on the condition of the environment • Recycling 	<ul style="list-style-type: none"> • Information • Graphs • Statistics 	<ul style="list-style-type: none"> • Information about the environment • Ozone layer facts • Steps to improve your environment 	<ul style="list-style-type: none"> • Environmental laws • Debate transcripts • Recent environmental happenings (policy and events) 	<ul style="list-style-type: none"> • Issues concerning the environment that are in the news right now. • Information about EPA, its present activities, history, goals, etc. • Links to other environmental sites.
Post-Test Questions					
Were the task questions type of info you'd look for?	Yes	Yes	Yes	Yes	No
Use Search Tool?	Yes	Yes	Yes	Yes	Yes

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
What info would bring you back to site?	Would return, but no reason given.	Information needed for AP Environmental Science	Information for environmental science reports.	Class assignments and research.	For projects, beach report (although not current enough to be useful)
How did you feel when perform-ing a task?	Knew where I was	Knew where I was	Knew where I was	Knew where I was (most of the time)	Knew where I was
Would it be easy or difficult to find info that interests you on the site?	Easy	Easy	Easy	Easy (mostly)	Easy
It was easy to find info on home page:	Some of the time	Most of the time	Most of the time	Most of the time	Most of the time
Info flowed logically:	Most of the time	Most of the time	Most of the time	Most of the time	Most of the time
I'd like the site to have:	<ul style="list-style-type: none"> Improved sidebar topics (some information under the topics didn't particularly pertain to the topic). 	<ul style="list-style-type: none"> A more concise search option. 	NR	<ul style="list-style-type: none"> Updated graphics (they seemed dated by a few years) Better search function More direct navigation. 	<ul style="list-style-type: none"> Side-bars that load properly Direct link from EPA home page to student page.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Focus Group Questions					
Browser	Explorer	Explorer	Explorer	Explorer	Explorer
1. How begin search/favorite search engines and search terms?					<ul style="list-style-type: none"> • Ask.com • Aol.search • MedCollar.com
2 Would you come back to this site? Why?					<ul style="list-style-type: none"> • Yes, if had a project to do or wanted to use the beach report. Would not return just for fun.
Is it easy to use?					<ul style="list-style-type: none"> • Yes, the general topics are good, but the specific information is hard to find.
Did you understand the information you found?					<ul style="list-style-type: none"> • Yes
Did you usually feel as if you knew where you were in the site?					<ul style="list-style-type: none"> • Didn't feel lost. • Sometimes took wrong turns but could always find home.
Do you understand the type of info on the site?					<ul style="list-style-type: none"> • Yes - environmental information.
Does site contain interesting and /or useful information?					<ul style="list-style-type: none"> • Useful, but not so interesting.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Do you like the design and colors?					<ul style="list-style-type: none"> • Yes
Do you like the graphics?					<ul style="list-style-type: none"> • Yes, really like the globe and pictures.
Are site descriptions clear and complete?					<ul style="list-style-type: none"> • Yes
Do site descriptions give a good idea of site contents?					<ul style="list-style-type: none"> • Yes, very helpful.
Would you make any changes?					
Other Comments					
Task 1- Please go to the EPA home page at www.epa.gov. Can you find the EPA <i>Student Center</i> Web site from this page?					
General Paths Tried	<ul style="list-style-type: none"> • Kids icon/couldn't find teacher site • Back • Audience Groups/Students/ 	<ul style="list-style-type: none"> • Couldn't find on the Home Page • Did Search and found the site. 	<ul style="list-style-type: none"> • Audience Groups/Students 	<ul style="list-style-type: none"> • Kids/Students/Teachers/<i>Student Center</i> 	<ul style="list-style-type: none"> •
User Attitude	<ul style="list-style-type: none"> • Back button 			Effortless	<ul style="list-style-type: none"> • Confusion • Back button
Graphics Comments					<ul style="list-style-type: none"> • I like the graphics

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments		<ul style="list-style-type: none"> <i>Student Center</i> should be accessible through left side-bar of EPA home page. 	<ul style="list-style-type: none"> It was sort of hard to find because there was no immediate sign of the <i>Student Center</i> on the EPA home page. 	<ul style="list-style-type: none"> There should be a direct link from the EPA home page to the <i>Student Center</i>. Didn't think to click on "Audience Group" and didn't notice the alt tag/mouse-over that describes what's in this section. 	
Technical Difficulties					<ul style="list-style-type: none"> Side-bars didn't load
Other Comments					
Task Completed?	Yes	Yes	Yes	Yes	Yes
<p>Task 2 - Please look for information describing EPA's main purpose.</p>					
General Paths Tried		<ul style="list-style-type: none"> About EPA 	<ul style="list-style-type: none"> About EPA/EPA's Mission 	<ul style="list-style-type: none"> About EPA/EPA's Mission 	<ul style="list-style-type: none"> Went back to EPA Home Page and found "About EPA" Search Once side-bars loaded, went to "About EPA"/EPA's Mission
User Attitude	<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Effortless 		<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Confusion Back button Search tool

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Graphic s Comments					
Disappointment Comments					<ul style="list-style-type: none"> • “I don’t know where to go!”
Technical Difficulties	<ul style="list-style-type: none"> • Page didn’t load correctly. 		<ul style="list-style-type: none"> • Page was very slow to load, especially the side-bars. Had to click refresh and/or along the areas where the side-bars should be. 	<ul style="list-style-type: none"> • Page didn’t load properly on this or any other task. 	<ul style="list-style-type: none"> • Side-bars didn’t load and this caused confusion. • Even after she found the correct answer, she was confused as to whether it was right.
Other Comments	<ul style="list-style-type: none"> • The mission was easy to find. 	<ul style="list-style-type: none"> • Easy to find. 		<ul style="list-style-type: none"> • Mission Statement is “typical” - kind of vague. Maybe should have bullets with key point and then elaborate. 	
Task Completed?	Yes	Yes	Yes	Yes	Yes
Task 3- Your teacher has asked you to write a research paper about the ozone layer. Can you find a site that will tell you the function of the ozone layer and how it performs this function?					
Paths Tried			Air/Ozone Depletion/Questions and Answers.	<ul style="list-style-type: none"> • Environmental Basics/Guide to Env. Issues • EPA Search on “ozone, layer” - tried “Ozone Depletion” and “Glossary”/Back/ looked at other sites. 	<ul style="list-style-type: none"> • Went to NAS link • Would have tried Search function
User Attitude	<ul style="list-style-type: none"> • Effortless 				
Graphic s Comments					<ul style="list-style-type: none"> • Really liked the globe graphic

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments				<ul style="list-style-type: none"> Found a lot of information about ozone but not the specific answer to the task. 	<ul style="list-style-type: none"> Found related information, but not the specific answer to the task.
Technical Difficulties					
Other Comments	<ul style="list-style-type: none"> The answer was easy to find. 				
Task Completed?	Yes		Yes	No	No
Task 4: Find information on career as environmental scientist, including salary you could earn.					
Paths Tried	<ul style="list-style-type: none"> EPA publications Looked through EPA index page. 	<ul style="list-style-type: none"> Environmental Careers Resource Guide 	<ul style="list-style-type: none"> Found job codes (i.e., if looking for a job at EPA) from <i>Student Center</i>. Went to EPA Home Page and searched on “environmental scientist” Back to <i>Student Center</i> and found the Environmental Careers Resource Guide, but didn’t see the answer. 	<ul style="list-style-type: none"> Careers/Employment Opptys at EPA Searched for employment opportunities Back Environmental Careers Resource Guide/Environmental Careers in Science 	<ul style="list-style-type: none"> Careers/Environmental Careers Resource Guide/Fact Sheets
User Attitude	<ul style="list-style-type: none"> Back button Search tool 	<ul style="list-style-type: none"> Effortless 	<ul style="list-style-type: none"> Frustrated 	<ul style="list-style-type: none"> Back button Search tool 	<ul style="list-style-type: none"> Effortless Back button Search tool
Graphics Comments				<ul style="list-style-type: none"> . 	
Disappointment Comments		<ul style="list-style-type: none"> . 	<ul style="list-style-type: none"> Looked and searched but couldn’t find job information 		

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Technical Difficulties					<ul style="list-style-type: none"> Side bar not loading properly
Other Comments	<ul style="list-style-type: none"> “The career topic shouldn’t be under EPA Publications. It should be under “Internships.” The participant could not find the answer in the “Internship” section. 				
Task Completed?	No	Yes	No	Yes	Yes
Task 5: Look for information about a beach in Maryland and see if it has been closed due to pollution.					
Paths Tried	Found “Water Where You Live”/Maryland/Beach Watch	<ul style="list-style-type: none"> Search tools 	<ul style="list-style-type: none"> In Your Neighborhood/Water Where You Live/Maryland/Beach Watch/Sandy Point State Park 	<ul style="list-style-type: none"> In Your Neighborhood/Surf Your Watershed/Locate Your Watershed - Maryland/At MD home page, found link to Beach Monitoring Sites/Sandy Point State Park 	
User Attitude	<ul style="list-style-type: none"> Back button False start 			<ul style="list-style-type: none"> Effortless False Start 	<ul style="list-style-type: none"> Effortless Confusion (wasn’t sure she had found the right information)
Graphics Comments			<ul style="list-style-type: none"> 		<ul style="list-style-type: none"> I like the map. It’s useful since I get lost. May want to update it, last revision was 1/21/00.

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments					<ul style="list-style-type: none"> Beach closing information was not current.
Technical Difficulties					<ul style="list-style-type: none"> Side bars not loading properly.
Other Comments	<ul style="list-style-type: none"> Got to Beach Watch and to a list of Maryland beaches, but was not able to find the specific information on beach closing. 	<ul style="list-style-type: none"> Should have a search option on each separate page, and it should cover only the information in that section. 		<ul style="list-style-type: none"> Although he tried a couple different paths, and found the answer through a different route than we expected, he did so easily and quickly. 	
Task Completed?	No	No	Yes	Yes	Yes
Task 6: Find a science experiment that helps you learn about how oil spills occur and how to clean them up.					
Paths Tried	<ul style="list-style-type: none"> Water/Cleanup for Kids/Experiments you can do. 	<ul style="list-style-type: none"> OSW <i>Explorers' Club</i> Water/Waste Treatment Search 	<ul style="list-style-type: none"> Ecosystems/Cleanup for Kids/What's the Story on Oil Spills?/Back/Scrolled down to find experiments 	<ul style="list-style-type: none"> Env. Club Projects/Water Drop Patch Project Back Tried several items on central Globe Back Waste/Recycling/Superfund 	
User Attitude	<ul style="list-style-type: none"> Effortless 			<ul style="list-style-type: none"> Back button False start 	<ul style="list-style-type: none"> Confusion Search tool
Graphics Comments					

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments		<ul style="list-style-type: none"> Should be able to find this through the Search tool. 		<ul style="list-style-type: none"> Might be helpful to have information organized by topic AND by activity (e.g., science experiments) 	<ul style="list-style-type: none"> It would help if the search engine brought user to links directly, instead of sending user to a page of UR Ls.
Technical Difficulties				<ul style="list-style-type: none"> Right side-bar didn't load properly. 	
Other Comments	<ul style="list-style-type: none"> This task was easy to complete. 				<ul style="list-style-type: none"> Section on science experiments would be helpful for younger kids, not so much at the high school level.
Task Completed?	Yes	No	Yes	No	Yes
Task 7 - How much garbage was generated in the U.S. during 2000?					
General Paths Tried			<ul style="list-style-type: none"> Waste & Recycling/Municipal Solid Waste Factbook/Clicked on small print at bottom of screen ("Waste Generation")/clicked on "Tons per year & pounds per capita" 	<ul style="list-style-type: none"> Waste/Recycling/Municipal Solid Waste Factbook/Table of Contents/Tons per Year 	<ul style="list-style-type: none"> Waste & Recycling/Municipal Solid Waste Factbook/TOC contents
User Attitude				<ul style="list-style-type: none"> Effortless Back button 	<ul style="list-style-type: none"> Effortless

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Graphics Comments				<ul style="list-style-type: none"> No problem reading the tables, but the graphics are a little dated. 	<ul style="list-style-type: none"> Cool graphics on this site.
Disappointment Comments			<ul style="list-style-type: none"> Print at bottom of page was very small and hard to read. 		<ul style="list-style-type: none"> Chapter (page) descriptions on the <i>Student Center</i> site are not very clear.
Technical Difficulties					
Other Comments	<ul style="list-style-type: none"> This task was easy to complete. 	<ul style="list-style-type: none"> Easy to find Very nice site, with information, pictures, statistics, and graphs. 			<ul style="list-style-type: none"> Comments under the links on each page are helpful.
Task Completed?	Yes	Yes	Yes	Yes	Yes
Task 8 - Find a map of the U.S. that displays the concentration of sulfur dioxide (SO₂) in the air in 1996. Did the D.C. area meet the National Ambient Air Quality Standards (NAAQS) in 1996?					
General Paths Tried	<ul style="list-style-type: none"> In Your Neighborhood/Air Now/Ozone/Ozone animation/airquality links/airquality trends DC 	<ul style="list-style-type: none"> Air Now/Air Quality Trends/SO₂ emissions. 	<ul style="list-style-type: none"> Tried Ozone Depletion, OAR, SO₂ Air Quality. 	<ul style="list-style-type: none"> Air/Acid Rain Sourcebook/AirNow Stop Air/Environmental Atlas/Air Quality 	
User Attitude	<ul style="list-style-type: none"> Confusion 			<ul style="list-style-type: none"> Back button Stop button False start 	<ul style="list-style-type: none"> Frustrated Confusion Back button
Graphics Comments				<ul style="list-style-type: none"> The maps are hard to read - very small print 	

Task/Data	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Disappointment Comments		<ul style="list-style-type: none"> Didn't find any maps, charts, or graphs about SO2. 	<ul style="list-style-type: none"> Found information about SO2 and on Air Quality Standards, but didn't find exact information requested in task. 		
Technical Difficulties				<ul style="list-style-type: none"> AIR NOW was very slow to download. 	<ul style="list-style-type: none"> Had to leave before time expired for this task.
Other Comments	<ul style="list-style-type: none"> Never found the site. Got lost on the pathway. Found some data on air quality but nothing to related air quality to NAAQS standards. 				
Task Completed?	No	No?	No	Yes	No - but left early.

APPENDIX 3

EPA ENVIRONMENTAL EDUCATION WEB SITES USER TEST SITE INFORMATION

Environmental Education Web Sites

User Testing Locations, Target Audience, and Site Contacts

Testing Location	EPA Web Site Tested	Target Audience	No. Tested	School Name and Address	School Principal	Main Contact
Arlington, VA	• <i>Explorers' Club</i>	• 4 th grade	• 7	Jamestown Elementary School	Mr. Laura Annan	Ms. Laila Gore Ms. Janet Hudgens
Chicago, IL	• <i>Student Center</i> • <i>Environmental Education Center</i>	• 7 th - 8 th grade • Teachers (4th,7th,8th grades & computer)	• 6 • 5	Sandoval Elementary School 5534 S. St. Louis Avenue Chicago, IL 60629	Mrs. Anna Garcia-Berlanga	Ms. Marlene Woytonik
Falls Church, VA	• <i>Explorers' Club</i>	• 3 rd grade	• 7	Thomas Jefferson Elementary School	Mr. Greg Alexiou	Mr. Greg Alexiou
Washington, DC	• <i>Student Center</i> • <i>Environmental Education Center</i>	• 10 th -11 th grade • Teachers (High School)	• 5 • 3	Woodrow Wilson High School 3950 Chesapeake St., NW Washington DC, 20016	Mr. Stephen Tarason	Ms. Andrea Thompson

APPENDIX 4
STUDENT CENTER HOME PAGE

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